

Metals Review

THE NEWS DIGEST MAGAZINE

Volume XXI, No. 7

FEATURE SECTION: WELDING

August 1948

On What Basis Do You Buy **STAINLESS AND ALLOY ELECTRODES?**

- ▶ on quality of product?
- ▶ on operating characteristics?
- ▶ on chemical analysis to meet strict specifications?
- ▶ on the qualifications of the manufacturer to give reliable technical information?

MELLON INSTITUTE
LIBRARY

AUG 30 1948

PITTSBURGH, PA.

WHY Arcos electrodes meet your requirements

Arcos manufactures the most complete line—56 grades regularly manufactured—for welding chrome and chrome-nickel steels, Monel, Nickel, and Inconel, low alloy high tensile steels and bronze.

Arcos has well-established distributors located in every important industrial center where you can find a convenient supply of Arcos electrodes and competent service.

Arcos maintains outstanding research and field engineering staffs to give Arcos users dependable technical assistance.

Send for latest Arcos bulletin
**"WELDING DISSIMILAR METALS
WITH STAINLESS ELECTRODES."**

BULLETIN 7481

ARCOS PRODUCTS

- 56 grades of stainless, alloy and non-ferrous electrodes.
- Stainless steel wire for inert arc, gas or automatic welding.
- Oxyarc Process for cutting all metals.



ARCOS

CORPORATION

1500 S. 50th ST., PHILADELPHIA 43, PA.



**MANAGEMENT
OFFICIALS**
5,796



**KEY PRODUCTION
MEN**
11,373



METALLURGISTS
2,722



ENGINEERS
6,833

**WILL YOU SELL
THESE MEN AT
PHILADELPHIA?**



**PURCHASING
AGENTS**
977



**OTHER PLANT
PERSONNEL**
8,555

**THEY'LL ALL BE AT THE
METAL SHOW—**
Looking for You
and Your Products!

● A good cross-section of the 35,000 men who will attend the Philadelphia Metal Show this October is illustrated above—based on facts from our Continuing Analysis of Attendance. This factual survey, which will be sent you on request, proves that the Metal Show audience comes from every state in the U.S. and many foreign countries.

According to their own statements, metal men attend the Metal Show for two primary reasons (1) for periodic checkup on equipment and materials (2) to find an answer to a specific problem. Over 90% of the 36,256 men who registered at last year's Exposition said their buying was influenced by what they saw and heard at the Show. Since these men influence purchases amounting to millions of dollars annually, this is an audience worth selling!

The simplest, most effective way to contact this important audience is through an exhibit in the Metal Show. Your prospects *come to you* at the Show—eager to learn the merits of your product. Take advantage of this great sales opportunity—write, wire or telephone for floor plan and full details!

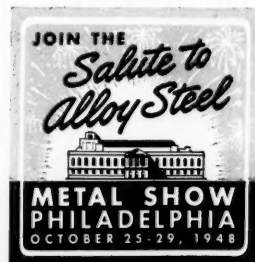
SOME CHOICE SPACES STILL AVAILABLE:

WRITE OR WIRE COLLECT: W. H. Eisenman, Managing Director
National Metal Exposition 7301 Euclid Avenue, Cleveland 3, Oh

**CLASSIFICATION BY BUSINESS AND INDUSTRY OF 36,256
1947 METAL SHOW REGISTRANTS SHOWN ABOVE**

Manufacturers of Assembled Metal Products—18,225 • Commercial Processing Plants—125 • Forging, Stamping, Welding, Machining, Heat Treating—1,898 • Plate and Structural Fabricators—560 • Foundries and Die Casting Plants—1,263 • Other Metal Parts—2,062 • R. R., Public Services, Mines, Nonmetals—3,839 • Producers of Metals (Ferrous and Non-ferrous)—4,206 • Federal, State, Municipal and Foreign Governments—44 • Distributors, Dealers and Exporters—1,546 • Consulting and Contracting Engineers and Firms—488 • Trade Associations, Chambers of Commerce, Libraries, Schools—1,170 • Students—263 • Unclassified—567.

Sponsored by
the American Society for
Metals in cooperation
with the American Weld-
ing Society, the Institute
of Metals Division of the
American Institute of
Mining and Metallurgical
Engineers, and the Socie-
ty for Non-Destructive
Testing.



National METAL EXPOSITION
PHILADELPHIA—OCTOBER 25 thru 29, 1948

Metals Review

THE NEWS DIGEST MAGAZINE

RAY T. BAYLESS, Publishing Director

MARJORIE R. HYSLOP, Editor

GEORGE H. LOUGHNER, Production Manager

VOLUME XXI, No. 8

AUGUST, 1948

A.S.M. REVIEW OF METAL LITERATURE

ORE BENEFICIATION	4
Preparation and Concentration	
SMELTING, REDUCTION AND REFINING	4
(Including Electrolytic Refining)	
PROPERTIES	6
Physical, Mechanical and Chemical	
CONSTITUTION AND STRUCTURE	10
Metallography, Constitution Diagrams, Crystal Structure	
POWDER METALLURGY	14
Processes and Products	
CORROSION	16
Theory, Measurement, Prevention (Except Coatings)	
CLEANING AND FINISHING	20
Chemical and Mechanical; All Types of Coatings Except Electrodeposited	
ELECTRODEPOSITION AND ELECTROFINISHING	24
(Plating, Electropolishing, Electroforming)	
PHYSICAL AND MECHANICAL TESTING	26
(Except Quality Control and Stress Analysis)	
ANALYSIS	28
Qualitative and Quantitative; Identification Methods	
APPARATUS, INSTRUMENTS AND METHODS	30
Industrial Measurement and Control (Except Temperature);	
Laboratory Equipment and Procedures	
INSPECTION AND STANDARDIZATION	32
(Including Quality Control, Radiography, Specifications)	
TEMPERATURE MEASUREMENT AND CONTROL	34
FOUNDRY PRACTICE	34
Methods and Equipment (Except Furnaces)	
SCRAP AND BYPRODUCT UTILIZATION	36
FURNACES AND HEATING DEVICES	36
(Including Induction and Resistance Heating Equipment)	
REFRACTORIES AND FURNACE MATERIAL	38
HEAT TREATMENT	38
(Including Flame Hardening, Induction Heating, Cold Treatment)	
WORKING	40
Rolling, Drawing, Forging, Stamping and Presswork, Shot-Peening	
MACHINING	44
(Including Tools, Machinability and Cutting Fluids;	
Excluding Flame Cutting)	
MISCELLANEOUS FABRICATION	46
General Manufacturing and Assembly Procedures; Plant Operations;	
Materials Handling	
JOINING AND FLAME CUTTING	48
Welding, Brazing and Soldering	
APPLICATIONS	52
General and Specific Uses of Metals	
DESIGN AND STRESS ANALYSIS	54
Metallurgical Factors in Design of Parts, Equipment and Structures	
STATISTICS	56
Resources, Supplies, Production	
MISCELLANEOUS	58
(Including Research, Lubrication and Friction;	
Other General and Unclassified Subjects)	
NEW BOOKS	58

WELDING SECTION

Brazing, Soldering and Oxy-Acetylene Processes, by Robert W. Bennett	3
<i>A survey of a year's literature points up the development of better and faster fabrication methods</i>	
Welding Supplies and Equipment	9
<i>Manufacturers describe new products and techniques developed during the past six months</i>	
Books on Welding	41
<i>Part VI of Sibyl Warren's "Bibliography of Metallurgical Books" covers the welding field.</i>	

SPECIAL FEATURES

A Salute to Alloy Steels, by Francis B. Foley	19
<i>A.S.M. President invites assistance in developing a special theme for the 1948 National Metal Congress</i>	
A.S.M. Tentative Technical Program and Preprint List	23
<i>Papers to be presented at the Metal Congress in Philadelphia next October</i>	
Roster of A.S.M. Chapter Officers	29
<i>The men who will guide local chapter activities during the coming 1948-49 season</i>	

DEPARTMENTS

Reader Service Coupon	17
Compliments	25
The Reviewing Stand	25
Employment Bureau	57
Manufacturers' Bulletins	59
Advertisers Index	63

Published monthly by the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio; Francis B. Foley, President; Harold K. Work, Vice-President; William H. Eisenman, Secretary; E. L. Spanagel, Treasurer; Arthur E. Focke, John E. Dorn, E. G. Mahin, C. M. Carmichael, Trustees; Alfred L. Boegehold, Past President. Subscriptions \$5.00 per year (\$6.00 foreign). Single copies \$1.00. Entered as Second Class Matter, July 28, 1930, at the Post Office at Cleveland, Ohio, under the Act of March 3, 1879.

ANNOUNCING THE Third Metallographic Exhibit

to be held at the National Metal Congress and Exposition in Philadelphia, Oct. 25 to 29, 1948. Rules are simple and few; there are no restrictions as to size or method of mounting. A large area in the exhibition hall has been reserved so the entries can be displayed to best advantage.

RULES FOR ENTRANTS

Work which has appeared in previous Metallographic Exhibits is unacceptable.

Photographic prints shall be mounted on stiff cardboard, each on a separate mount. Each shall carry a label giving

Name of metallographer

Classification of entry

Material, etchant, magnification

Any special information as desired

Transparencies or other items to be viewed by transmitted light must be mounted on light-tight boxes wired for plugging into an ordinary lighting circuit, and built so they can be fixed to the wall.

Exhibits must be delivered between Oct. 1 and Oct. 20, 1948, preferably by prepaid express or registered parcel post.

Address:

Metallographic Exhibit,
c/o W. H. Eisenman
National Metal Congress and
Exposition
Commercial Museum
34th. below Spruce,
Philadelphia, Pa.

CLASSIFICATION OF MICROGRAPHS

1. Cast Irons and Cast Steels
2. Toolsteels (except carbides)
3. Irons and Alloy Steels (excluding stainless)
4. Stainless and Heat Resisting Steels and Alloys
5. Light Metals and Alloys
6. Heavy Nonferrous Metals and Alloys
7. Powder Metals (and carbides) and Compacts
8. Weld Structures (including brazed and similar joints)
9. Surface Phenomena (including corrosion products and electroplates)
10. Series of Micros showing Transitions or Changes During Processing
11. Macrographs of Metallurgical Objects or Operations (2 to 10 diam.)
12. Results by Non-Optical or other Unconventional Techniques.

AWARDS AND OTHER INFORMATION

A committee of judges will be appointed by the Metal Congress management which will award a first prize (a blue ribbon) to the best in each classification. Honorable Mentions will also be awarded other photographs which in the opinion of the judges closely approach the winner in excellence.

A Grand Prize, in the form of an engrossed certificate, and a money award of \$50 will be awarded the exhibitor whose work is adjudged "best in the show", and his exhibit shall become the property of the American Society for Metals for preservation and display in the Sauveur Room at the Society's Headquarters.

The Society reserves the right to retain all prize-winning micrographs for six months for a traveling exhibit to Chapters. All other exhibits will be returned to owners by prepaid express or registered parcel post during the week of Nov. 1, 1948. Entrants living outside the U. S. A. will do well to send micros by first-class letter mail endorsed "May be opened for Customs inspection before delivery to addressee".

30th NATIONAL METAL CONGRESS

COMMERCIAL MUSEUM, PHILADELPHIA

October 25 to 29, 1948

Brazing, Soldering and Oxy-Acetylene Processes

A Survey of a Year's Literature

By Robert W. Bennett

Welding Engineer, Battelle Memorial Institute

DURING RECENT years, considerable effort has been directed toward faster methods for processing and fabricating ordnance and other materials. With an increase in processing capacity and the substitution of various materials to alleviate the war-developed shortages, science and industry have worked together to develop faster and better fabrication methods.

A review of the 1947 literature relating to brazing, soldering, gas welding, and oxygen cutting indicates that previous technological advancements in these processes have been improved upon, with a view to meeting competition in a peacetime market.

Brazing

According to the American Welding Society Definitions Committee, brazing is defined as "a group of welding processes wherein coalescence is produced by heating to suitable temperatures above 800° F. and by using a nonferrous filler metal having a melting point below that of the base metal. The filler metal is distributed in the joint by capillary attraction." When the joining is performed at a temperature under 800° F., the process is termed "soft soldering".

Brazing methods are distinguished from each other by the manner in which heat is applied. The four major methods are: furnace brazing, electrical brazing (resistance and induction), dip brazing, and torch brazing. Batch or continuous furnace brazing is usually employed where high production is required. Manufacturers have been attracted to this process because, when controlled atmospheres are used, strong, clean joints can be made without the aid of fluxes and subsequent cleaning operations. Furnace atmospheres of hydrogen, dissociated ammonia, processed gases, and various mixtures of carbon monoxide, hydrogen, nitrogen, and methane have been successfully used for preventing oxidation of the parts and the brazing alloy (22-37, Feb. 1947; 22-662, Dec. 1947).^{*} Recent trends have been toward a broader use of electrical brazing methods. At present, capacity is more than four times as great as in 1939 (22-314, Aug. 1947).

Iron, steel and nonferrous castings

in modern engineering practice are becoming increasingly complex in design; they are difficult to cast and scrap losses are oftentimes high. Production costs can be reduced by simplifying the foundry problem. Instead of making an elaborate one-piece casting, the components of the part are machined, assembled, and then brazed as a unit. The automobile cylinder block is an excellent example of a difficult casting that has been simplified by redesigning so that the component parts can be assembled and brazed. According to Giroux (22-37, Feb., 1947), the cylinder blocks for Crosley cars are brazed assemblies of 120 parts of various sizes, shapes and materials.

In some applications, gray cast iron is the most economical material to use, as well as the best to meet certain design problems. Until recently, brazing gray cast iron to steel or other metals was considered impractical because of the interference caused by graphite, scale, and sand inclusions. Development of a method for surface treating gray cast iron that produces a pure ferritic surface so it can be copper or silver brazed satisfactorily has been described by Heron (22-186, May 1947) and Atkinson (22-664, Dec., 1947). Torque and air-leakage tests of silver brazed assemblies of cast iron cylinders and steel stampings have shown high strength and good internal soundness. The repair of broken or defective gray iron castings by brazing has been facilitated by this cleaning method.

The silver brazing process has also been extended to the manufacture of articles whose usage demands corrosion resistant materials and high-strength joints. In the manufacture of steam turbines, joints on the spacers and lacing wires of stainless steel turbine blades have been brazed with silver alloy. Joints between copper, brass, or copper-coated steel tubing, and the stainless steel evaporator shells of refrigerators are silver brazed quickly and economically. Swift (22-234, June, 1947) states that the 18-8 classes of stainless steel can

be silver brazed easily, but as the chromium content of the alloy steel increases, the difficulty of brazing increases. When stainless steel parts are prepared for brazing, the joint surfaces must be mechanically cleaned, in addition to the usual degreasing or cleaning process used with mild steels.

The success of a brazed joint depends not only on proper cleaning and fluxing, but also on proper joint design and tolerances and equal distribution of the brazing alloy throughout the joint. Preplaced inserts in the form of rings, washers, or wires, appear to be the most desirable method, regardless of heating procedure. Reviews of brazing processes by the British authors Hendrick (22-662, Dec. 1947) and Brooker (22-618, Dec. 1947) cover the production equipment, methods, materials used for brazing, brazing alloys, fluxes, joint design, and other fundamentals essential for an understanding of the process and the wide variety of brazing applications.

Several unique and unusual brazing techniques have been developed for the production of radio and other types of tubes. In the manufacture of X-ray tube anode assemblies, a copper sleeve and stainless steel bushing are silver soldered to the anode head by placing the assembly in a glass vacuum pot heated by an induction unit (20-82, March 1947). Bondley (22-349, Aug. 1947) describes a method for joining the magnesium silicate ceramic parts of a radio tube to the metal parts and wires. Silver or silver-copper alloys are used in a hydrogen atmosphere or vacuum furnace. The development of these techniques constituted a major advance in the design and construction of many well-known and widely used electronic tubes.

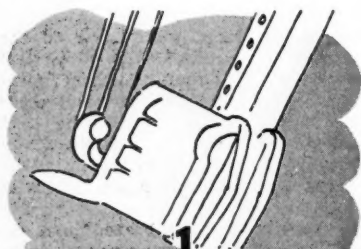
Although the literature emphasizes the use of silver alloy brazing where lower melting points are desirable, copper alloy brazing should not be neglected. Because of their good wetting and flowing action and ability to produce clean, strong joints, copper alloys are popular for brazing ordinary steel assemblies made of stampings, screw machine parts, and tubing. Here, again, the advantages of furnace brazing in

(Turn to page 5)

^{*} Literature references are cited by the corresponding item number in the *Review of Current Metal Literature* instead of repeating entire title, author, and source; this information can be obtained by referring to *Metals Review* for the month indicated.

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received in the Library of Battelle Memorial Institute, Columbus, Ohio, During the Past Month



ORE BENEFICIATION

1a—General

1a-19. Kornstorlekens inverkan på kulkvarnaskulornas slitage. (Influence of Grain Size on the Wear of Ball-Mill Balls.) Sture Mörtzell. *Jernkontorets Annaler*, v. 132, 1948, p. 112-114.

1a-20. New Dry Concentrating Equipment. W. J. Long. *Bureau of Mines, Report of Investigations No. 4286*, May 1948, 10 pages.

Vibrating-deck mineral separator; electrostatic-mineral shape separator; and progressing-field magnetic separator developed to separate minerals of different shape, magnetic susceptibility, or electrostatic conductivity.

1b—Ferrous

1b-14. The Preparation of Iron Ore for Blast Furnace and Open Hearth Use. Robert R. Williams. *American Iron and Steel Institute, Preprint*, 1948, 19 pages.

Crushing and screening, sintering plant operation, blending and re-claiming, sampling and weighing, hand picking, and effect of prepared ores on blast furnace practice. Analyses and properties.

1b-15. Cranberry Magnetite Deposits, Avery County, N. C., and Carter County, Tenn. M. H. Kline and T. J. Ballard. *Bureau of Mines, Report of Investigations No. 4274*, May 1948, 85 pages.

Investigative work and results of mineral-dressing tests. Concentration and pilot-mill tests and suggested flow sheet for ore.

1c—Nonferrous

1c-48. Concentration of Copper-Cobalt Ores From the Blackbird District, Lemhi County, Idaho. H. R. Wells, W. G. Sandell, H. D. Snedden, and T. F. Mitchell. *Bureau of Mines, Report of Investigations No. 4279*, May 1948, 21 pages.

Results of laboratory and small-scale pilot-plant investigations of beneficiation.

1c-49. Nchanga Consolidated Copper Mines, Ltd.; Northern Rhodesia,

South Africa, Part II. H. A. Talbot. *Deco Trefoil*, v. 12, May-June 1948, p. 5-12.

Primary crushing plant; washing plant; coarse-ore storage; secondary crushing and screening sections; grinding section; flotation section; concentrate handling; tailings disposal; flow sheet; future metallurgical practice; and present metallurgical practice.

1c-50. Bubble-Particle Contacts in Flotation. *Engineering and Mining Journal*, v. 149, July 1948, p. 95-97.

Photographs taken from consecutive frames of high-speed movies, taken through a microscope, of galena particles in contact with bubbles. Technique used in obtaining these pictures.

1c-51. Montana's Platinum Producer. W. H. Love. *Mining World*, v. 10, July 1948, p. 24-26.

Green Mountain Mining Co. successfully operates 50-ton plant to recover high-grade concentrate rich in platinum. Mineralization, and milling and concentration procedures. Copper, silver, and gold are also produced.



SMELTING, REDUCTION and REFINING

2a—General

2a-9. Sinter Quality and Effect of Sinter on Blast Furnace Practice. J. L. Mauthe. *Blast Furnace and Steel Plant*, v. 36, July 1948, p. 817-824.

Results of tests carried out in recent years to develop a better understanding of the nature of sinters and their effect on blast-furnace operations.

2b—Ferrous

2b-127. Oxygen, Hydrogen and Sulphur in Steelmaking. Frank G. Norris. *Industrial Heating*, v. 15, June 1948, p. 988, 990, 992, 994.

Reviews several papers presented at recent A.I.M.E. meeting.

2b-128. Use of Oxygen for Decarburization and Melting in Electric Furnaces. J. H. Elsaman. *American Iron and Steel Institute, Preprint*, 1948, 10 pages.

Use of oxygen in stainless steel, alloy steels, single-slag alloys, and

single-slag carbon-steel manufacture.

2b-129. A Vasao Metalica Do Cubilo. (Melting Rate of Cupola Furnaces.) Fabio Decourt Homem de Melo. *Boletim da Associacao Brasileira de Metais*, v. 4, April 1948, p. 173-176.

A formula for calculation of melting rate based on various operating factors. Data obtained agree quite satisfactorily with those of experimental investigation.

2b-130. Estudo de Duas Corridas de Aco Em Fornos Siemens Martin Basico. (Study of Two Melts of Steel in the Siemens-Martin Basic Furnace.) David Leon Schwartzman and Horacio J. Ceccantini. *Boletim da Associacao Brasileira de Metais*, v. 4, April 1948, p. 211-236.

Results of experimental work performed by a group of college students. Conditions necessary for oxidation of C, Si, Mn, P, and S were established for four types of slags.

2b-131. Kinetics of the Transfer of Sulphur Across a Slag-Metal Interface. Lo-Ching Chang and Kenneth M. Goldman. *Metals Technology*, v. 15, June 1948, T.P. 2367, 19 pages.

Ways in which such studies will lead to fruitful results from both the practical and theoretical standpoints.

2b-132. Direct Oxidation in the Basic Open Hearth Process. Edward B. Hughes and Frank G. Norris. *Metals Technology*, v. 15, June, 1948, T.P. 2380, 17 pages.

Two series of heats were studied with special attention to refining practice. The rates of carbon elimination for ore and direct oxidation were accurately determined. New method for determining the efficiency of carbon elimination. 16 ref.

2b-133. Low-Grade Ores; The Krupp-Renn Plant at Salzgitter. *Iron and Steel*, v. 21, June 1948, p. 285-287. Condensed from F.I.A.T. Report No. 727 by W. M. Pollitzer.

Krupp-Renn method, a roasting reduction process by which a product with 95% Fe is manufactured in a rotary kiln.

2b-134. Russian Steel-Making Research; Recent Work on Air-Oxygen Mixtures. *Chemical Age*, v. 58, June 5, 1948, p. 785-786.

2b-135. Gas for Steel Making. Arthur Q. Smith. *Industrial Gas*, v. 26, June 1948, p. 5-7, 29.

Use by Atlantic Steel Co., Atlanta, Ga.

2b-136. Desulphurisation and Dephosphorisation of Molten Cupola Iron and Pig-Iron in Basic-Lined Ladles; Report by Sub-Committee T.S. 10 of the Technical Council. *Proceedings of the Institute of British Foundrymen*, v. 40, 1946-1947, p. B14-B21; discussion, p. B21-B40.

(Turn to page 6)

BRAZING, SOLDERING, GAS WELDING

controlled atmospheres are well recognized. Not only is the controlled-atmosphere brazing furnace indispensable for maintaining production schedules, but it is also useful for batch operations, such as fabrication of brazed jigs, salvaging broken tools, and brazing cemented carbide tips to tool shanks. In general, the techniques and precautions necessary for silver brazing can also be applied to copper alloy brazing. Consequently, the joining procedure used is dependent upon the intended use of the product, the materials employed, the economics, and production requirements.

Until recently, brazing has not been used to any great extent in joining aluminum because suitable filler metal and flux materials were lacking. These are now available for joining the 2S, 3S, 53S and 61S alloys. Aluminum plate clad with a brazing sheet for subsequent joining operations is also on the market. Aluminum can be successfully brazed by furnace, dipping, or torch methods, the latter described by Huff (22-248, May, 1947), who outlines the problem involved, and describes the materials, fluxes, brazing procedures and techniques, and design considerations, as well as many applications. In aluminum brazing (as in joining other materials with nonferrous filler metal) proper cleaning, fluxing, application of filler metal, and post-braze cleaning are imperative to produce joints of optimum efficiency.

Soldering

Soft solders are used primarily because of their ease of handling and low temperature of application. As in brazing, the soldering processes are classified according to the manner in which heat is applied, namely, machine soldering, dip soldering, iron or bit soldering, blowpipe or torch soldering, and sweat soldering. The great bulk of soft soldering is done with lead alloys containing 18 to 65% tin.

In general, three stages are observed during a soldering operation: First, molten solder is supplied to the joint; second, the solder wets and spreads over the fluxed joint faces; and third, the joint clearance fills with a sufficient amount of solder. Developments in this method of joining have been directed toward improving the solder compositions and fluxes so that a wider variety of materials can be soldered, and production can be increased.

Harper and Strauss (22-127, April, 1947), writing on soft soldering as a production process, detail the various methods that can be used for

efficient mass production of high-quality joints in sheet and strip steel. The enormous demand for tin-plate containers has been responsible for the development of high-speed machine soldering methods. Dip soldering has been effectively used for joining assemblies containing a large number of joints, such as radiators and commutators.

Of the soldering methods, iron or bit soldering is probably the most widely used because of its maneuverability and heat localization. This method is best for spot soldering electrical connections and small irregular joints. Carbon soldering and resistance heating have also been used with good results for spot soldering operations. Dupre (22-240, June, 1947) has found that modernization of carbon soldering methods by use of proper mixtures has accelerated the manufacture of aircraft instruments and other delicate assemblies considerably above that of conventional manual methods. Furthermore, carbon soldering is applicable to all solders from bismuth, melting at 150° F., to silver brazing alloys melting at 1600° F. The fluxes used with the carbon bits are the same as those used with the copper irons.

Torch soldering has a wide variety of applications and is especially use-

ful for soldering heavy sections or parts where deep penetration requires a greater heat input. On these sections, however, care must be exercised to prevent overheating, which discolors the metal or induces metallurgical changes. The process was used to crack a production bottleneck in the fabrication of air conditioning units (22-226, May, 1947). By moving the work at a predetermined speed under a fluxing brush followed by oxygen-acetylene heating and solder feeding, the production rate was substantially increased.

In soldering aluminum, the same problem occurs as in brazing. The oxide film must be removed and prevented from re-forming while making the joint. Some research has been done on the use of vibrations in the sonic range to remove oxide films and to aid wetting of aluminum by solders (22-570, Nov., 1947). This research indicated that strip aluminum can be coated with solder by dipping it in a vibrating bath. The method might be useful for small objects but was not considered practical for large objects because of the advanced methods available for electroplating aluminum with copper or other metals. It has been pointed out by others, however, that supersonic aids have promoted good soldering techniques in Germany for tinning aluminum sheet metal and wire (22-171, May, 1947).

The Swiss have recently developed a new solder for 2S, 3S, and 52S aluminum that requires no flux (22-276, July, 1947). Tests in this country have shown that the solder is easy to use and produces high-quality joints between aluminum and brass, or other aluminum parts. Fundamental details of various other solders, fluxes, and techniques for joining aluminum by soft soldering have been discussed in the British publication *Light Metals* (22-132, April, 1947; 22-171, May, 1947).

Along with the spectacular recent advances in nuclear physics, a unique soldering method was devised for making beryllium targets to be used in a cyclotron (22-154, April, 1947). The beryllium plate is first cleaned by light grinding. Commercial liquid gold is burned on several times and the plate heated until the gold has alloyed with the beryllium. A final gold layer is then deposited and left glossy. A thick copper layer is electrolyzed onto the gold, after which the beryllium plate is soldered on the target support in the ordinary manner.

Gas Welding

Little information is to be found in the literature for 1947 on the subject of gas welding. Barrash (22-671, Jan., 1948) gives a good review of the basic principles of oxy-acetylene welding and also describes the

(Turn to page 7)



R. W. Bennett is an engineer on the welding research staff of Battelle Institute. He has had diverse industrial experience in welding technology, both at Battelle and at the Caterpillar Tractor Co., with which he was formerly associated. He is a graduate in metallurgy from the Colorado School of Mines, and is a member of American Welding Society and Sigma Xi

Experiences using soda ash in ladle treatment. Types of dolomite linings and results obtained in service trials.

2b-137. Utilizing Cupola Metal in Open Hearth Charge. A. W. Gregg. *Steel*, v. 123, July 19, 1948, p. 116, 118, 121.

Operating technique enabling cupola operation for 72 to 100 hr. without dropping bottom, now being used in several steel plants.

2b-138. The Modern Open Hearth. T. J. Ess. *Iron and Steel Engineer*, v. 25, July 1948, p. O19-O70.

A manual on the subject. Steel capacity and production for various years since 1875; A.I.S.I. and S.A.E. designations for different compositions; diagrams and descriptions of typical openhearth, including details of materials of construction and dimensions of parts; properties of the refractories used; plant layout and buildings; instruments and controls; fuels, oil-burner design, and raw materials. Type of charges; charging and melting; the process itself; working and finishing the heat; tapping; pouring, molds, solidification of ingots; slags, yields, production rates; use of oxygen; fuel consumption, heat balances; the acid process; and services (electricity, water, and steam) required. Appendix tabulates steel companies of the U. S., giving number of furnaces, type, and capacity. 44 ref.

2b-139. O.H. + O₂ = ? D. E. Carb. *Blast Furnace and Steel Plant*, v. 36, July 1948, p. 801-805.

Use of oxygen in the openhearth process and economics of high-pressure charging.

2c—Nonferrous

2c-32. Investigation of the Formation of Ferrites of Cobalt and Nickel. (In Russian.) T. I. Bulgakova, Ya. I. Gerasimov, Yu. P. Simanov, and L. L. Klyachko-Gurvich. *Zhurnal Obshchei Khimii* (Journal of General Chemistry), v. 18 (80), Jan. 1948, p. 154-164.

The investigation made by solution of reaction products in H₂SO₄; by use of X-ray phase analysis; and by a magnetic method. Rates and temperature ranges of ferrite formation for mixtures of NiO and of CoO with Fe₂O₃.

2c-33. Electrolytic Preparation of Zinc Dust. Walter Eckardt. *Bureau of Mines, Information Circular No. 7466*, May 1948, 6 pages.

Production of Zn dust from sodium zincate solutions, giving details of the commercial method and apparatus developed in Germany.

2c-34. Reactions of Carbon and Metal Oxides in a Vacuum. W. J. Kroll and A. W. Schlecht. *Journal of the Electrochemical Society*, v. 93, June 1948, p. 247-258.

None of the oxides studied were stable in contact with carbon in a vacuum at above 1380° C. Oxides of multivalent metals reacted at temperatures of 700° C. or less. As a method for producing pure metals, best results were obtained with Cr, V, Nb, and Ta. It was concluded that the vacuum reduction method is practical only for production of the more expensive and rare metals. 21 ref.

2c-35. The Preparation and Properties of Pure Titanium. I. E. Campbell, R. I. Jaffee, J. M. Blocher, Joseph Gurland, and B. W. Gonser. *Journal of the Electrochemical Society*, v. 93, June 1948, p. 271-285.

Ductile titanium of high purity is produced by decomposing titanium iodides, formed by the action of iodine vapor upon the crude metal, on a hot filament. Working and mechanical properties.

2c-36. The Oxidation of Chalcocite in Air Compared with Its Oxidation in Pure Oxygen. John R. Lewis, J. H. Hamilton, John C. Nixon, and Curtis L. Graversen. *Metals Technology*, v. 15, June 1948, T.P. 2388, 9 pages.

The use of oxygen or oxygen-enriched air in roasting of copper sulphide minerals. Laboratory work on a pure chalcocite prepared synthetically. Results obtained at various temperatures between 250 and 700° C. The optimum results were obtained near 450° C.

2c-37. Producing an Alloying Element of High Purity. W. L. Hammerquist. *Journal of Chemical Education*, v. 25, July 1948, p. 392-393.

Process developed for production of pure manganese.

2c-38. Influence of Physicochemical Factors on the Loss of Metals of the Platinum Group During Cupellation of Lead. (In Russian.) J. N. Plaksin and E. A. Marenkov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the USSR, Section of Technical Sciences), Feb. 1948, p. 209-221.

Experiments were performed with and without silver. The effectiveness of the latter in preventing losses of Pt and Pd and its ineffectiveness with regard to Rh and Ir were established. The amount of Pb retained by the Pt group metals after cupellation with Pb in the absence of silver was determined.

2c-39. Interaction of Tin With Metal Silicates. (In Russian.) D. M. Chizhikov and E. I. Khazanov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the USSR, Section of Technical Sciences), Feb. 1948, p. 223-228.

Thermodynamic analysis and experimental data concerning the reaction between tin and slags of different compositions showed that increase in temperature aids in complete reduction. Optimum composition for tin smelting is indicated.

2c-40. Electrochemical Dissolution of Metal Sulphides. (In Russian.) D. M. Chizhikov and B. Z. Ustinski. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the USSR, Section of Technical Sciences), Feb. 1948, p. 229-234.

A study of the above for sulphides of Cu, Ni, and Co in an acid electrolyte shows that a current density of 100-300 amp. per sq. m. is required for solution with an average yield of 65%. Sulphur remains in elementary form, forming a crust which increases the necessary voltage.

2c-41. Reactions of Oxides and Sulphides With Metal Chlorides. (In Russian.) G. S. Frents. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, (Bulletin of the Academy of Sciences of the USSR, Section of Technical Sciences), Feb. 1948, p. 235-238.

The reactions of SnO₂ with chlorides of Fe, Zn, Ca, and Mg; reactions of compounds of Fe and Zn with chlorides of Ca and Mg; and of sphalerite with FeCl₃. It was found that the chlorination of cassiterite should be performed at 800° C. in the presence of a reducing agent. Under these conditions certain compounds of other metals are also chlorinated.

2d—Light Metals

2d-13. Le dégazage des alliages d'aluminium. (Degasification of Aluminum

Alloys.) Louis Grand. *Fonderie*, March 1948, p. 1075-1086.

Different methods (using chlorine or hexachloroethane) were investigated. Influence on composition and mechanical properties.

2d-14. Die schweizerische Aluminium-erzeugung. (Production of Aluminum in Switzerland.) A. von Zeeleder. *Chimia*, v. 2, April 10, 1948, p. 69-75.

Methods used.

2d-15. Alumina From Clay by the Lime-Sinter Method. Part II. F. R. Archibald and C. M. Nicholson. *Metals Technology*, v. 15, June 1948, T.P. 2390, 25 pages.

Treatment of clays found in very extensive deposits in the Carolinas and Georgia using the lime-sinter process. Limestone and kaolin are mixed and fired until the silica is converted to dicalcium silicate and alumina to calcium aluminate. The sinter is leached with Na₂CO₃ solution and filtered. Alumina trihydrate is precipitated from the filtrate by CO₂, filtered, and dehydrated to alumina.

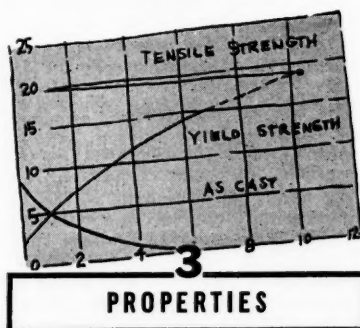
2d-16. Melting Magnesium. F. A. Allen. *Light Metals*, v. 11, June 1948, p. 358-360.

Methods used and suggestions for improvements.

2d-17. Probleme der Nichteisenmetallurgie. (Problems of Nonferrous Metallurgy). Paul Röntgen. *Metall*, Dec. 1947, p. 104-108.

Two problems in the metallurgy of aluminum: mechanism of the reactions in the electrolysis of aluminum; and the production of aluminum from clay. Several different methods of production are critically discussed.

For additional annotations indexed in other sections, see:
15c-5; 15d-6; 19b-89-92; 20a-293; 27d-10.



3a—General

3a-55. High Temperature Bolting Materials. Ernest L. Robinson. *American Society for Testing Materials, Preprint No. 16S*, 1948, 22 pages.

Performance data on a series of materials suitable for use at various temperatures from room to 1500° F.

3a-56. An Experimental Study of the Influence of Various Factors on the Mode of Fracture of Metals. P. G. Jones and W. J. Worley. *American Society for Testing Materials, Preprint No. 17*, 1948, 15 pages.

Experimental results for three steels and an aluminum alloy. The effect of strain aging on the mode of fracture of a semikilled steel and a rimmed steel. Temperatures from room to -310° F. were used in determining the temperature of tran-

(Turn to page 8)

BRAZING, SOLDERING, GAS WELDING

equipment used and some industrial applications.

During the war, the Germans developed a technique for deep-fillet gas welding which utilizes the same basic considerations as metal-arc deep-fillet welding (22-52, Feb., 1947). Because of the increased operating speed and lower gas and filler-metal consumption, this procedure is more economical for flat, position, or difficult welding operations than any gas welding practice known at present. The excellent service record of many pressure vessels indicates the high quality of the joints obtained by this method.

Oxygen Cutting

The urgent need for increased production during the war stimulated the development of new equipment and methods for cutting and processing large castings and forgings, and the cutting of circular, straight-line, and irregular shapes from plates of various thicknesses. With the re-conversion of industry to competitive peacetime production, oxygen cutting is being retained as a production tool because of its economy, speed, accuracy, and flexibility. Emphasis has been directed toward the development and improvement of semi-automatic, fully automatic, and remote controls for flame cutting equipment. Improved gas supply and regulating equipment has increased the speed of operation as well as the thickness of section that can be cut (22-266, July, 1947).

Babcock (22-54, Feb., 1947) describes a blowpipe that is capable of cutting steel up to 66 in. thick. Oxy-acetylene cutting can therefore replace the earlier methods of lancing, sawing, drilling, and blasting for severing large steel sections in foundries, mills, forge shops, and shipyards. In this apparatus, oxygen pressure does not increase with increases in material thickness (as it does with smaller blowpipes on material less than 20 in. thick). While larger nozzles are used with thicker materials, the optimum blowpipe oxygen pressure decreases with in-

crease in nozzle size, reaching a low of 7 psi. for material over 4 ft. thick.

Kiernan and Sohn (22-215, May, 1947), writing on the oxygen cutting of steel at elevated temperatures, show the relationship between speed, cutting oxygen, flow rate, temperature, and the thickness and carbon content of the material for severance and quality drop cuts. Among other things, they found that oxygen cutting at elevated temperatures conforms to the same general principles as cutting at room temperature, without loss of quality or dimensional tolerances.

For further increases in production rates, industry has taken advantage of synchronous multiple-torch operations where the over-all time cycle is no longer than for a single cut (22-266, July, 1947). The cutting of intricate shapes automatically and accurately by multiple-torch arrangements was made possible by improvements in controlling apparatus such as magnetic and electronic tracing devices that reproduce the pattern of a templet automatically and precisely.

During the automatic oxygen cutting of component parts for Browning pistols during the war, some of the cut pieces would drop off clean while others were fused together at the bottom of the kerf. A metallurgical study of the difficult-to-cut parts (22-609, Dec., 1947) disclosed that deep decarburization on the surface caused the difficulty. Grinding to remove the carbon-free surface, carburization, or more rigid material control eliminated this difficulty.

Improved techniques for stack and profile cutting as a means for increasing production have been described (22-76, March, 1947).

Oxygen cutting of stainless and other high-alloy steels, as well as non-ferrous metals, has been a fabrication problem for many years. Formation of a highly refractory chromium oxide on the faces of the kerf prevented further oxidation by the oxygen stream and made it impossible to cut stainless steels with normal

oxy-acetylene methods. The problem has been solved by the development of flux injection and powder-cutting methods for stainless steel, and the equipment, improvement in cutting techniques, and production applications are described in a number of articles. (22-89, March, 1947; 22-162, May, 1947; 22-111, April, 1947; 22-623, Dec. 1947; 22-101, March, 1947; 22-263, July, 1947; 22-109, April, 1947).

In general, the process consists of injecting a powdered flux into the cutting-oxygen stream to remove the chromium oxide. Cutting can begin without waiting for a preheat period. As the cut progresses into the material, the refractory oxides are continuously removed by a combination melting and fluxing action. The flux-feeder unit is simple and inexpensive, and can be used with conventional oxy-acetylene equipment.

This process is being used extensively in steel mills for cutting sections up to 26 in. thick; conditioning stainless steel ingots, billets, and slabs; removing hot tops from ingots; and cutting slabs for making clad plates. In foundries, savings result from the rapid removal of risers from stainless castings; the process also provides an easier and more satisfactory method for cutting cast iron. In fabricating shops, the same production methods can be used for cutting stainless, monel, Inconel, pure nickel, and the clad steels, as in the oxy-acetylene cutting of mild steels.

Another method recently introduced for hand cutting of stainless and alloy steels, cast iron, and non-ferrous metals is called the Oxyarc process (22-65, March, 1947). The metal is cut by a stream of oxygen fed through a tubular, coated, metal-arc electrode, preheat being supplied by an arc between the electrode and piece being cut. Stock up to 3 in. thick can be cut by this method, or pierced up to 12 in. thick.

In addition to the fabrication applications mentioned for the flux-injection method, the Oxyarc process can also be used for cutting projections, studs, or bolts that are inaccessible by other methods. In flame cutting mild steel, where the cut does not start at an edge, this method also provides a rapid means of piercing a hole for a starting point.

**HAVE YOU MADE
YOUR HOTEL
RESERVATIONS**

**FOR THE 30TH
NATIONAL METAL
CONGRESS AND
EXPOSITION
PHILADELPHIA
OCT. 25-29**

SEE

- Hotel reservation form on page 61.
- Advance Registration Form on page 63.
- "Salute to Alloy Steels" on page 19.
- Convention program and pre-print list on page 23.
- Metallographic Exhibit entry rules on page 2.

(7) AUGUST, 1948

sition from ductile to brittle fracture.

3a-57. Theory of Ferromagnetism of Binary Alloys. (In Russian.) S. V. Vonsovskii. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 131-144.

A simple generalization of the quantum theory of ferromagnetic materials for binary alloys. Dependence of the Curie point of such alloys on the concentration of their components and on structural arrangement of the atoms. It is shown that, at low temperatures, the relationship of spontaneous magnetization to temperature is the same as for pure metals. 21 ref.

3a-58. Concerning Peculiarities of the Variation of Electrical Conductivity of Several Ferromagnetic Alloys in a Magnetic Field. (In Russian.) S. V. Vonsovskii. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 145-148.

A theoretical analysis of the Thompson effect for a series of ferromagnetic substances.

3a-59. Concerning Changes of Electrical Conductivity in a Magnetic Field (Thompson Effect) in Alloys Having High Coercive Force. (In Russian.) V. I. Drozhzhina and Ya. S. Shur. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 149-152.

Investigation to determine the relationship between coercive force and Thompson effect for an alloy containing 58% Fe, 27% Ni, and 15% Al. Thompson-effect measurements for Fe, 4%-Si; and for 52%-Co, 10%-V, 38%-Fe alloys.

3a-60. Influence of Degree of Order and Composition on the Hall Effect in Alloys During Approach to an Ordered State. (In Russian.) A. A. Smirnov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 153-160.

Determination of the Hall constant at various stages during the formation of solid solutions. Despite the fact that the mathematical analysis was done on the basis of simplified models, the author believes that the basic qualitative conclusions are valid.

3a-61. Influence of Relaxation and Recrystallization on the Magnetic Properties of Soft Magnetic Materials. (In Russian.) V. I. Drozhzhina, M. G. Luzhinskaya, and Ya. S. Shur. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 167-174.

Investigation for transformer steel (96% Fe, 4% Si) and for molybdenum permalloy (78.5% Ni, 4% Mo, 17.5% Fe), showing effects of different degrees of deformation and of different heat treating schedules.

3a-62. Influence of Size and the Stress System on the Flow Stress and Fracture Stress of Metals. D. J. McAdam, Jr., G. W. Geil, D. H. Woodard, and W. D. Jenkins. *Metals Technology*, v. 15, June 1948, T.P. 2373, 19 pages.

Results of an investigation of the influence of a wide range of sizes of specimens on the flow stress and fracture stress of both notched and unnotched cylindrical specimens of annealed low-carbon steel and oxygen-free copper. Data for flow and fracture of unnotched specimens and notched specimens with four different notch angles and also different sized specimens. It was found the statistical theory of fracture is not applicable to the fracture of metals after even slight plastic deformation; and that increase in fracture stress with increase in sharpness of the notch is due to increase in the ratio of transverse

to longitudinal tensile stress, not to a size effect. 27 ref.

3a-63. Explosives with Lined Cavities. Garrett Birkhoff, Duncan P. MacDougall, Emerson M. Pugh, and Geoffrey Taylor. *Journal of Applied Physics*, v. 19, June 1948, p. 563-582.

Explosives detonated in contact with thick steel plates produce much deeper holes in the steel when there is a cavity in the explosive in contact with the plate. The mathematical theory of this phenomenon. The process is separated into two phases: first, formation of part of the metal liner into a long thin jet traveling longitudinally at very high velocities and, second, the forcing aside of the target material by the extremely high pressures produced upon impact. The theories of both phases are based upon the classical hydrodynamics of perfect fluid which is applicable because the strength of the metals involved can be neglected at the high pressures encountered. 28 ref.

3a-64. Developments in Metals and Alloys for Chemical Plant Equipment. W. Z. Friend. *Chemical Engineering Progress*, v. 44, July 1948, p. 501-510; discussion p. 510.

Recent developments for improving mechanical and physical properties of alloys at elevated temperatures. (Al alloys, Cu and high-Cu alloys, Ni and high-Ni alloys, Fe-Ni alloys, stainless steels, and miscellaneous alloy steels.) 36 ref.

3b—Ferrous

3b-86. Effect of Composition on Low Carbon Austenitic Chromium-Nickel Stainless Steels. George C. Kiefer and Claude M. Sheridan. *American Iron and Steel Institute, Preprint*, 1948, 24 pages.

Corrosion resistance in the fully annealed condition; effect of short and relatively long exposure in the sensitizing range on corrosion resistance and susceptibility to intergranular attack; and mechanical properties.

3b-87. A New Cast Iron. I. Characteristics of the Nodular Graphite Structure. II. Examples of Chemical and Mechanical Properties. J. G. Pearce. *Chemical Age*, v. 58, May 1, 1948, p. 616-618; June 5, 1948, p. 783-784.

Previously abstracted from "Acicular Cast Iron," *Engineering*, v. 165, Dec. 19, 1947, p. 596; Dec. 26, 1947, p. 607-608. See item 3b-7, 1948.

3b-88. Stabilization of Austenitic Stainless Steel. *Steel Processing*, v. 34, June 1948, p. 306-307. A condensation. Previously abstracted from complete paper by Samuel J. Rosenberg and John H. Darr, *Journal of Research of the National Bureau of Standards*, v. 40, April 1948, p. 321-338. See item 3b-69, 1948.

3b-89. Influence of Austenite on the Magnetization Curve of Steel. (In Russian.) V. V. Parfenov and R. I. Yanus. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 161-166.

Magnetization of tempered Cr-Mn steel with austenite contents up to 74% in fields of 20 to 12,000 oersteds. Proportionality between magnetization and final concentration of the ferromagnetic phase exists to a great extent for fields of medium magnetic resistance as well as for high-resistance fields.

3b-90. Alloy Cast Irons; Their Present State of Development. Arthur B. Everest. *Iron and Steel*, v. 21, June 1948, p. 279-284, 288.

Properties of various types, with emphasis on those containing nickel.

3b-91. Improved Properties With Nickel Alloys. Part II. What Nickel Does for Iron and Steel. J. S. Vanick. *Canadian Metals & Metallurgical Industries*, v. 11, June 1948, p. 14-18, 32-33. Properties of various cast nickel-steels. Examples leading to creation of a specification or particular foundry procedure.

3b-92. Anelastic Properties of Iron. Ting-Sui Ke. *Metals Technology*, v. 15, June 1948, T.P. 2370, 27 pages.

A number of anelastic effects observed in alpha-iron, and attempts to derive valuable information from a critical study of these effects. The interrelation between various anelastic effects; the experimental methods and apparatus used, and the results; their theoretical interpretation. 30 ref.

3b-93. Stainless Steel Castings. *Machinery Lloyd*. (Overseas Edition), v. 20, June 19, 1948, p. 103.

A metallurgical modification involving the addition of small proportions of special elements to improve machinability.

3b-94. Nickel Steel Resists Damage in Low Temperature Drop Test. *Steel*, v. 122, June 28, 1948, p. 104; *Welded Vessels for -320° F. Industry and Welding*, v. 21, July 1948, p. 36.

Vessels of 8½% Ni and stainless steel showed no material damage while a carbon steel vessel was shattered by impact of a weight dropped from a height of 5 ft. onto vessels filled with liquid nitrogen.

3b-95. Solved and Unsolved Problems in the Metallurgy of Blackheart Malleable. Harry A. Schwartz. *Foundry*, v. 76, July 1948, p. 74-75, 216, 218, 220, 222, 224, 226, 228-230, 232, 234, 236, 238.

Previously abstracted from *American Foundryman*, v. 13, June 1948, p. 46-54. See item 3b-83, 1948.

3b-96. Solved and Unsolved Problems in the Metallurgy of Blackheart Malleable. H. A. Schwartz. *Foundry Trade Journal*, v. 84, June 17, 1948, p. 577-584, 586.

Previously abstracted from *American Foundryman*, v. 13, June 1948, p. 46-54. See item 3b-83, 1948.

3c—Nonferrous

3c-37. Fatigue Properties of Some Coppers and Copper Alloys in Strip Form. H. L. Burghoff and A. I. Blank. *American Society for Testing Materials, Preprint No. 28*, 1948, 24 pages.

Results of reversed-bending fatigue tests on three types of Cu, five Cu-Zn alloys, and four other Cu-base alloys in the form of 0.032-in. strip. Relationships between fatigue strength, tensile strength, composition, degree of reduction by cold rolling, grain size, and angle of applied stress with respect to rolling direction.

3c-38. Etude statique de la magnétostriktion dans les alliages fer-nickel austénitiques. (Static Study of Magnetostriction in Austenitic Iron-Nickel Alloys.) Henri Deveze. *Comptes Rendus (France)*, v. 226, March 1, 1948, p. 727-729.

Results of an experimental study concerned most particularly with self induction and with corresponding variation in length, for alloys containing 36 to 100% Ni.

3c-39. Influence of Pressure on the Resistance of Goldsilver Alloys. (In English.) A. Michels and T. Wassenaar. *Physica*, v. 14, April 1948, p. 61-62.

Electrical resistance for Au, Ag and three alloys of these metals as a function of pressure at 25° and 50° C.

3c-40. The Electrical Resistance of Potassium, Tungsten, Copper, Tin and Lead at Low Temperatures. (In English.) (Turn to page 10)

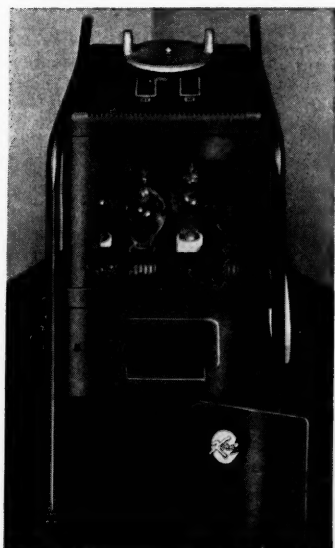
Welding Supplies and Equipment

*Manufacturers Describe New
Products and Techniques Developed
During the Past Six Months*

TO HELP KEEP industrial executives up to date with the myriad and rapidly developing improvements in the welding field, a unique project was recently sponsored by the **Whitehead Metal Products Co. (617)**. This was a three-day welding clinic held at the company's New York headquarters last May. Twelve manufacturers of welding equipment and supplies demonstrated techniques and tricks of the trade before 2600 spectators.

In many instances, manufacturers brought their own pieces to be welded or brazed at one of the dozen booths on the floor, with a choice of techniques covering gas, electric, heliarc, induction, gas and air, flame cutting and resistance welding methods. Hundreds of questions were answered about the inert-gas process, for instance, particularly in its application to the welding of magnesium and aluminum. Atomic hydrogen welding of thin sheets of high-nickel alloys was another focus of attention.

Further information about the processes demonstrated and the companies taking part in the clinic can be obtained by using the Reader Service Coupon on page 17 and specifying the number given above (617).



Kern Dual-Tronic Welder



*Industrial Executives Learn New Techniques at Whitehead
Metal Products Co.'s Welding Clinic*

New products and equipment developed during the past six months to further these latest welding techniques are described in the paragraphs that follow. Each one is numbered, and more complete information and descriptive literature from the manufacturers can be secured by checking the Reader Service Coupon on page 17 and mailing it to *Metals Review*.

Arc Welding

A new welder that combines both d.c. and a.c. welding in a single unit is known as the Kern Dual-Tronic (John A. Kern Co.—618). To supply direct current, the machine uses rugged rectifier tubes installed in a flexible mounting. Because of the absence of moving parts, the arc response is instantaneous, without the necessity of overcoming inertia or neutralizing armature reaction effects. The machine's a.c. welding characteristics include smooth, instant starting, stable arc action, and quiet, vibration-free operation. Both the d.c. and a.c. circuits can be used with the inert-gas shielded-arc process; for a.c. operation a high-frequency current is introduced into the circuit.

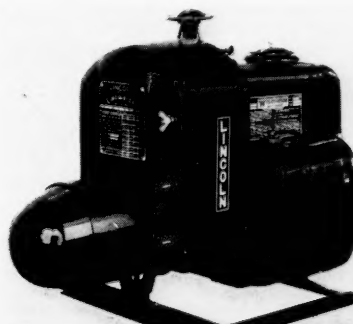
General Electric Co. (619) has introduced a new line of heavy-duty single-operator d.c. arc welders—Type WD-40 series—operating at 3500 r.p.m. and available in 200, 300 and 400-amp. ratings. A new single-dial, dual control feature combines the adaptability and precision of the

latter with the convenience of a single dial. The operator can thus preset the correct current for any given job without having to make other adjustments after the arc is struck.

From Air Reduction Sales Co. (620) comes the new Wilson "Wasp Special" air-cooled, engine-driven arc welding machine. It is a lightweight machine with a welding range of 25 to 250 amp. at 30 volts, 50% duty cycle.

A new lightweight portable welder driven by gasoline engine is available for the price usually paid for the welding generator alone, according to Lincoln Electric Co. (621). It measures roughly 2 ft. wide, 2 ft. high, and 4 ft. long, and has a current range of 20 to 180 amp. It can

(Turn to page 11)



Lincoln Lightweight Portable Welder

lish.) G. J. Van Den Berg. *Physica*, v. 14, April 1948, p. 111-138.

Measurements of electrical resistance of K wires in glass tubes, of single crystals of W, of technical Cu wires, of single crystals of Sn, and of Pb wires. 21 ref.

3c-41. Physical and Electrical Properties of Calcium. A. H. Everts and G. D. Bagley. *Journal of the Electrochemical Society*, v. 93, June 1948, p. 265-271.

As-cast and annealed structures.

3c-42. The Densities of Magnesium-Cadmium Solid Solutions. J. M. Singer and W. E. Wallace. *Journal of Physical & Colloid Chemistry*, v. 52, June 1948, p. 999-1006.

The densities of 13 unannealed Mg-Cd alloys, containing 6.65 to 96.32 atomic per cent cadmium, were determined with an estimated precision of 0.1%. The densities of 7 additional alloys containing 21.7 to 84.0 atomic per cent Cd were determined before and after annealing. The influence of annealing on the density is practically negligible. Composition can be determined to about 0.5 unit or better by use of the density-composition curve. 12 ref.

3c-43. Metal Electrons and Alloy Catalysis; The System Gold-Cadmium. George-Maria Schwab and Soteria Pessnatoglou. *Journal of Physical & Colloid Chemistry*, v. 52, June 1948, p. 1046-1053.

The two constants of the Arrhenius equation were measured for the dehydrogenation of gaseous formic acid with Ar-Cd alloys as catalysts. A functional relationship between the two. Brinell hardness of the alloys seems to run parallel to their activation energies. 12 ref.

3c-44. Indium Plated Lead Bearings Withstand High Stresses. Joseph Albin. *Materials & Methods*, v. 27, June 1948, p. 88-89.

Properties, plating procedures, and applications.

3c-45. Metastable States of Nickel Characterized by a High Initial Permeability. J. L. Snoek and J. F. Fast. *Nature*, v. 161, June 5, 1948, p. 887.

Variation of initial permeability of Ni with temperature.

3c-46. The Thermionic Properties of Chromium. H. B. Wahlin. *Physical Review*, series 2, v. 73, June 15, 1948, p. 1458-1459.

Spectral emissivity, temperature scale, and electron work function of Cr. Because it has very little ductility and therefore cannot be rolled or drawn into filaments of suitable shapes, a new method had to be used in preparing the samples.

3c-47. Uranium, Thorium, and Beryllium Melting and Fabrication. James F. Schumar. *U. S. Atomic Energy Commission, AECD-1851*, March 23, 1948, 9 pages.

Characteristics of above metals and difficulties encountered in casting them.

3c-48. Experimental Data on the Magnetostriction of Nickel. Y. Rocard. *Engineers' Digest* (American Edition), v. 5, May-June 1948, p. 180-182. Translated and condensed from *La Revue Scientifique*, no. 3267, Feb. 15, 1947, p. 195-204.

Values for direct and inverse magnetostrictive effect and experiments with various circuits.

3c-49. A Metallurgical Investigation of Five Forged Gas-Turbine Discs of Timken Alloy. J. W. Freeman, E. E. Reynolds, and A. E. White. *National Advisory Committee for Aeronautics, Technical Note No. 1531*, June 1948, 55 pages.

Tests to determine reproducibility of properties of disks made by dif-

ferent companies and to investigate effect of various fabrication procedures on disk properties. Properties at room temperature and 1200° F. Tests included short-time tensile, stress-rupture, creep, and hardness, along with a metallographic examination of the materials before and after testing.

3c-50. A High Strength, High Conductivity Copper-Silver Alloy Wire. W. Hodge, R. I. Jaffee, J. G. Dunleavy, and H. R. Ogden. *Metals Technology*, v. 15, June 1948, T.P. 2366, 17 pages.

Alloy of copper and silver was developed from which it was possible to obtain 29 B. & S. gage strands with tensile strengths in excess of 160,000 psi. combined with an electrical conductivity of over 70% I.A.C.S. The properties from various binary alloys of Cu and Ag, together with the method of fabrication developed to obtain the properties desired in fine-wire strands.

3c-51. Ueber die Brauchbarkeit und Verwendung von Zink in der Elektrotechnik. (Suitability of Zinc for Use in Electrical Technology.) Alfred Schulze. *Metall*, Nov. 1947, p. 76-79.

Present status of zinc as an electrical conductor. An alloy of zinc containing less than 1% Al meets the most important requirements, except that conductivity is considerably lower than copper or aluminum. A Zn-Fe alloy (0.13% Fe) has only slightly lower conductivity, but its mechanical properties and solderability are superior to those of the Zn-Al alloy.

3d—Light Metals

3d-31. Anodic Behavior of Aluminum in a Magnetic Field. George Antonoff and Anne Rowley. *Journal of Physical & Colloid Chemistry*, v. 52, June 1948, p. 1105-1108.

Aluminum immersed in a solution of certain aluminum salts does not conduct anodically, or does so very poorly. The usual explanation is that the passage of current is prevented by the formation of an oxide film. Other factors may be responsible for this peculiarity of aluminum and of other metals.

3d-32. New Temper Designations for Aluminum Alloys. R. B. Smith. *Iron Age*, v. 161, June 24, 1948, p. 72-78.

Modified system to meet requirements in industry.

3d-33. The Room and Elevated Temperature Properties of Some Sand-Cast Magnesium-Base Alloys Containing Zinc. Thomas E. Leontis. *Metals Technology*, v. 15, June 1948, T.P. 2371, 35 pages.

Certain Zn-containing Mg alloys have considerably higher tensile properties and creep resistance at elevated temperatures than present commercial Mg alloys and at the same time exhibit tensile properties at room temperature at least equal to those of the commercial alloys. 32 ref.

3d-34. The Flow and Fracture Characteristics of the Aluminum Alloy 24 ST After Alternating Tension and Compression. S. I. Liu and G. Sachs. *Metals Technology*, v. 15, June 1948, T.P. 2392, 12 pages.

Tests were made, varying both the tension strain and the compression strain within extreme limits. The tests revealed phenomena which have not been recognized to date. Further data were provided by using specimens of various contours (notched specimens) in the subsequent tensile tests.

3d-35. An Evaluation of Magnesium in Germany During World War II. Part IV. Hubert Altwicker and Ernest Jo-

sef deRidder. *Modern Metals*, v. 4, June 1948, p. 24-27.

Magnesium's resistance to corrosion, fatigue strength and the use of Mg-Al alloys by the German army and air force. (To be concluded.)

3d-36. Investigation on the Validity of an Ideal Theory of Elasto-Plasticity for Wrought Aluminum Alloys. E. G. Thomsen, I. Cornet, I. Lotze, and J. E. Dorn. *National Advisory Committee for Aeronautics, Technical Note No. 1552*, July 1948, 47 pages.

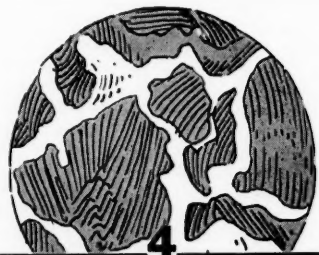
An investigation to determine relation between stresses and plastic strains of wrought aluminum alloys for tension, compression, and torsion loading. Stress-strain curves for various aluminum alloys.

For additional annotations indexed in other sections, see:

2c-35; 4a-28; 8-165; 9a-44; 23a-31; 23d-119; 24a-175; 27a-104; 27b-36.

SPECIAL BRONZES for all chemical and industrial purposes. Castings, rods, and forgings . . . 33 years' experience

American Manganese Bronze Co.
Holmesburg, Philadelphia 36, Pa.



CONSTITUTION and STRUCTURE

4a—General

4a-27. Ist eine bearbeitete Metalloberfläche feinstkristallin oder amorph? (Is a Worked Metal Surface Finely Crystalline or Amorphous?) Wolfgang Kranert and Heinz Raether. *Zeitschrift fuer Naturforschung*, v. 1, Sept. 1946, p. 512-513.

Surfaces of cold worked Se, Sb, and Bi are crystalline, although the structure is very fine.

4a-28. On the Structure of the High Temperature Metals. Russell Franks. *American Iron and Steel Institute, Preprint*, 1948, 24 pages.

Metals being used in development of jet engines, gas turbines, and other related high-temperature applications.

4a-29. Cobalt and Iron. I. Correlation of Transformation Mechanisms. *Metal Industry*, v. 72, June 11, 1948, p. 481, 487.

Discusses three recent papers.

4a-30. Transient Nucleation. David Turnbull. *Metals Technology*, v. 15, June 1948, T.P. 2365, 10 pages.

Nucleation theory developed by Volmer and Becker to transformations in condensed systems. Acceleration of the nucleation rate with time for the decomposition of austenite to pearlite. Increase in the nucleation rate during recrystallization may be explained on the same basis. 14 ref.

4a-31. Grains, Phases, and Interfaces: An Interpretation of Microstructure. Cyril Stanley Smith. *Metals Technology* (Turn to page 12)

be used on light or heavy-gage metal, as well as for the repair of cast iron structures.

For home or small workshop, **Miller Electric Mfg. Co. (622)** has announced the "Hobby Arc". It is available for either 110 or 220-volt a.c. lines, operates on a standard 30-amp. fuse, and will deliver 100 amp. (Literature available.)

A portable a.c. welder that can pinch-hit as a source of 110-volt a.c. power for lights, tools or other equipment is a novel development by **Hobart Brothers Co. (623)**. It is gasoline driven and delivers 200 amp. A simple switch converts it from welding current to a.c. power source. (Literature available.)

Hidden Arc, Submerged Melt and Heliarc Welding

The Manual Lincolnweld, introduced by **Lincoln Electric Co. (624)** increases the versatility of the hidden arc process by providing simplified, maneuverable equipment with a capacity of 600 amp. Mounted on the welder is a compact unit containing the wire reel, feed mechanism, drive motor and voltage controls. A cone-shaped welding gun holding 3½ lb. of flux is attached by cable to the machine. The welding wire is automatically fed to the work through the flux that is deposited from the gun. The current densities used with the Manual Lincolnweld are extremely high, so that it is possible to use a 5/64-in. electrode wire, generally fed at a rate of about 300 in. per min.

A new machine for making welds to any outline by its submerged-melt welding process has been announced by **Linde Air Products Co. (625)**. In this machine the WM-6 carriage used in oxy-acetylene shape cutting carries and guides a Unionmelt welding head. With a strip templet, any desired outline can be followed. The Type U welding head illustrated has a maximum current

capacity of 2000 amp., and can weld in a single pass material from 18-gage to 1¼-in. plate.

A newly developed bare bronze wire for submerged-arc welding is marketed by **Ampco Metal, Inc. (626)**. It is supplied in ¼ and 3/16-in. diameters, and is satisfactory for overlaying large steel areas for bearing, wear and corrosion resistant service or for joining aluminum bronze.

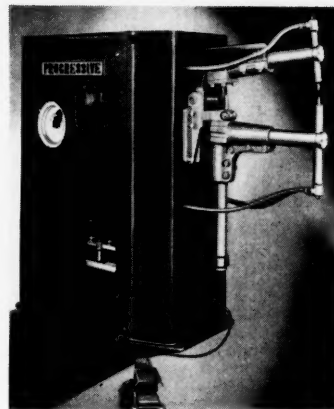
A complete line of heliarc welders is now available from **Miller Electric Mfg. Co. (627)**, and includes five models. Two control panels are provided for either manual or automatic welding. (Literature available.)

Resistance Welding

A line of standardized spot welding guns, constructed from interchangeable standardized component parts, is an innovation announced by **Progressive Welder Co. (629)**. There are seven basic gun types in the series. Standardized components are the gun chassis, the jaw extensions, the interchangeable hydraulic or air-operating cylinders, optional cable locations, handles, and universal cable terminal clamps, switches, electrodes and electrode holders. A gun can be quickly converted to a different job by simply changing one or two of these parts. (Literature available.)

Progressive Welder has also announced a new and improved line of standard air-operated rocker-arm welders, in both 30 and 50-kva. capacities and with throat depths ranging from 18 to 36 in. for each capacity (630). Improvements include a larger range of adjustment of throat opening and greater rigidity of mounting for the electrode holders in the arms. Transformer, lower arm and upper arm all have independent water cooling circuits. (Literature available.)

Annular projection welds require equal distribution of current around



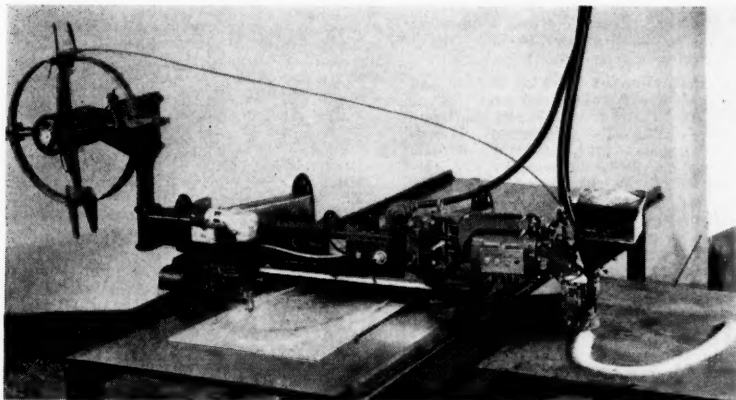
Progressive Rocker-Arm Welder

the weld and equalized welding force over the weld area. Higher than normal welding current is required for this type of weld. To keep power demand to a minimum, **Taylor-Winfield Corp. (631)** has designed a highly efficient air-operated press welder. Rated at 150 kva., it delivers 58,000 amp. with the exceptionally low power demand of 348 kva. at 61% power factor while projection welding electrical terminals to refrigerator motor housing cases. A special divided secondary with a very low impedance provides higher electrical efficiency with low power demand.

Several specialized welders have recently been built by **Federal Machine and Welder Co.** One is a special Ultra-Speed multiple spot welder for automobile dash panels (632). It utilizes two Ultra-Speed units, two water-cooled transformers, and 76 hydraulically operated welding guns to produce 80 completed parts per hr. Second is a projection welder that attaches the lips to coffee pots at a rate of 4000 per 8-hr. day, as against a previous rate of 1000 (633). Simplified dies and a special low-inertia spring head are features. Third is an automatic cylinder-forming seam welder that requires only one unskilled operator (634). With a forming feature incorporated in the machine, it eliminates a notching operation, a roll forming operation, and intermediate cylinder handling.

A special multiple projection welder designed by **Sciaky Bros., Inc. (635)** welds four clips simultaneously on four sizes of stove panels (literature available), while another Sciaky multiple welder (636) speeds production of wheels for toys. This machine is actually two welders mounted opposite each other, each with a set of eight opposing electrodes. Each unit houses two transformers and full electronic controls. Wheels drop into welding position through a gravity-feed chute. (Literature available.)

(Turn to page 13)



Unionmelt Shape Welding Machine

For Bulletins and Further Information, Use Reader Service Coupon on Page 17

gy, v. 15, June 1948, T.P. 2387, 37 pages.

Theory that many microstructures result from an attempted approach to equilibrium between phase and grain interfaces whose surface tensions geometrically balance each other at the points and along the lines where they meet. From this, a number of principles are derived which may be of interest to the metallographer and of practical use in explaining failures and in designing alloys for particular service. Limited to structures obtained after full annealing. 27 ref.

4a-32. Influence of Crystal Plane and Surrounding Atmosphere on Chemical Activities of Single Crystals of Metals. Allan T. Gwathmey, Henry Leidheiser, Jr., and G. Pedro Smith. *National Advisory Committee for Aeronautics, Technical Note No. 1460*, June 1948, 67 pages.

Influence of crystal plane of single crystals of 13 metals on rates of chemical processes important to the operation or manufacture of lubricated surfaces. These processes are oxidation in air, corrosion by oils; wetting of the surface by stearic acid with Cu, Ni, and Fe; rearrangement and roughening of the surface due to action of hot gases; and electrochemical processes including deposition, etching, replacement, and in a few cases, galvanic action.

4b—Ferrous

4b-44. Melting Points of Iron Oxides on Silica; Phase Equilibria in the System Fe-Si-O as a Function of Gas Composition and Temperature. L. S. Darken. *Journal of the American Chemical Society*, v. 70, June 1948, p. 2046-2053.

The stable phases under various conditions of temperature and gas composition for the ternary system Fe-Si-O. The data were used to interpret the migration of silica through iron oxide to the scale-metal interface during the scaling of steel. 15 ref.

4b-45. How Atmospheric Nitrogen Encourages Galling and Fatigue Failures. H. Schottky and H. Hiltenkamp. *Steel*, v. 123, July 5, 1948, p. 97, 110, 113-114. Translated from the German.

Severe local friction of steel parts resulting in galling also leads to absorption of nitrogen from the atmosphere. This causes brittleness, which results in cracks leading to fatigue failures. Metallographic indication of increased nitrogen content, and its confirmation by chemical analysis, using a special sampling technique. Observations on a badly worn gear coupling and on a broken Cr-Ni-steel shaft confirm the nitrogen absorption. 11 ref.

4b-46. The Formation of Crystals of Spectroscopically Pure Iron. D. Luther Phillips. *Research*, v. 1, July 1948, p. 479-480.

Formation of crystalline deposits on the surface of mild steel rods on heating for four days at 1000° C. in a horizontal position in sealed, evacuated silica tubes. The crystals were found to be aggregates of spectroscopically pure alpha iron.

4c—Nonferrous

4c-37. Beobachtungen ueber Thalliumdiffusion in Kristallinem hexagonalem Selen. (Observations on the Diffusion of Thallium Into Crystalline Hexagonal Selenium.) B. Gudden and Kurt Lehovec. *Zeitschrift fuer Naturforschung*, v. 1, Sept. 1946, p. 508-511.

Near the melting point of Se, Tl ions diffuse into the former with considerable speed. The diffusion can be observed spectroscopically, but more conveniently by measuring the effect of Tl on the conductivity of Se.

4c-38. The Crystal Structures of Molybdenum and Tungsten Borides. (In English.) Roland Kiessling. *Acta Chemica Scandinavica*, v. 1, no. 10, 1947, p. 893-916.

Similarity between the borides and some carbides is noted. 19 ref.

4c-39. Reactions of Zirconium with Gases at Low Pressure. W. G. Guldner and L. A. Wooten. *Journal of the Electrochemical Society*, v. 93, June 1948, p. 223-235.

The reaction products were studied by means of electron and X-ray diffraction. It was found that ductile zirconium strip can dissolve as much as 38 atom % O₂ without formation of a new phase. A new apparatus for the study of gas-metal reactions at low pressure. 10 ref.

4c-40. Gases nos Bronzes. (Gases in Bronzes.) Clovis Bradaschia. *Boletim da Associacao Brasileira de Metais*, v. 4, April 1948, p. 123-144.

Results of a study of the mechanism of gas absorption and of effect of the gases. Methods for their elimination. 24 ref.

4c-41. Concerning the Character of the Bonds in Phases Formed by Transition Metals With Light Metalloids. (In Russian.) S. A. Nemnonov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 247-252.

Systems containing chromium and H, C, O, and N. On the basis of experimental study of the different types of bonds formed, X-ray data obtained by other investigators are explained. 14 ref.

4c-42. The Cobalt-Chromium Binary System. A. R. Elsea, A. B. Westerman, and G. K. Manning. *Metals Technology*, v. 15, June 1948, T.P. 2393, 24 pages.

The phase diagram was determined as a part of a fundamental study of the factors promoting high-temperature strength of alloys. The first part of the work was concentrated on the Co-rich part of the diagram, and especially the alpha-beta transformation. Later, the study was extended to include the entire diagram. The determination consisted primarily of a metallographic study of specimens heat treated at various temperatures. X-ray diffraction was used to identify phases in some cases. Methods used and results obtained.

4c-43. Cobalt and Iron. II. The Transformation of Cobalt. *Metal Industry*, v. 72, June 25, 1948, p. 524, 527.

Reviews three recent papers.

4c-44. Influence of Crystal Plane and Surrounding Atmosphere on Some Types of Friction and Wear Between Metals. Allan T. Gwathmey, Henry Leidheiser, Jr., and G. Pedro Smith. *National Advisory Committee for Aeronautics, Technical Note No. 1461*, June 1948, 37 pages.

Influence of crystal plane on dry static friction between two single crystals of copper; influence of surrounding atmospheres of H₂ and N₂ containing 0.2% O₂ on wear between two dry polycrystalline copper surfaces; effect which variation in roughness with plane due to etching has on wear in atmospheres of air and H₂; experiments with recrystallization of a copper single crystal surface upon quenching from a high temperature; and influence of sunlight on atmospheric tarnishing of copper crystals.

4c-45. The Constitution of the Alu-

minium-Rich Ternary Alloys of Aluminum and Manganese With Zinc and Cadmium. D. W. Wakeman and G. V. Raynor. *Philosophical Magazine*, v. 39, April 1948, p. 245-259.

Constitution of the Al-Mn-Zn alloys was examined in the range 0-6% Mn and 0-40% Zn by the establishment of a 500° C. isothermal. A ternary compound analogous to corresponding compounds in the systems Al-Mn-Ni and Al-Mn-Cu was found to exist. Similar work on Al-Mn-Cd alloys at 600° C. revealed no ternary compound. Thus Ni, Cu and Zn are within the zone of favorable atomic size for the formation of ternary compounds of the type considered, while Cd, with a larger atom, is outside. 11 ref.

4c-46. Die Atomgitterfestigkeit von Kristallen und Metallen als bestimmter Bruchteil des Elastizitätsmoduls. (The Atomic Lattice Strength of Crystals and Metals as a Definite Factor in Modulus of Elasticity.) J. Bingel. *Archiv fur Metallkunde*, v. 1, July-Aug. 1947, p. 300-304.

The strength of the ideal atomic lattice of cubic face-centered crystals was calculated by Madelung's lattice potential and Born's electrostatic potential methods as a definite component of the modulus of elasticity. The method is then extended to metals, especially copper.

4d—Light Metals

4d-15. Contribution a l'etude des alliages aluminium-zinc-magnesium et aluminium-zinc-magnesium-cuivre. (Contribution to the Study of Aluminum-Zinc-Magnesium and Aluminum-Zinc-Magnesium-Copper Alloys.) Adrien Saulnier. *Comptes Rendus (France)*, v. 226, Jan. 12, 1948, p. 181-182.

A-ZG (7.5% Zn; 2.5% Mg; remainder, Al) and A-ZGU (7.5% Zn; 2.5% Mg; 1.5% Cu; remainder, Al) were investigated with regard to the phases present at various temperatures.

4d-16. Dispersion des vitesses des ondes acoustiques dans l'aluminium. (The Rate of Propagation of Acoustic Waves in Aluminum.) Ph. Olmer. *Acta Crystallographica*, v. 1, May 1948, p. 57-63.

Intensity measurements of X-ray diffuse scattering by single crystals of aluminum at ordinary temperatures which give information on mode of propagation of transverse and longitudinal elastic waves in the crystal. 18 ref.

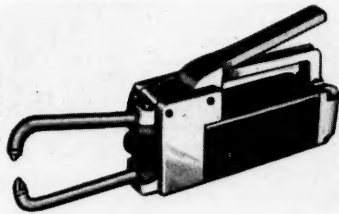
4d-17. Über den Zerfall übersättigter Magnesium-Mischkristalle. (The Decomposition of Supersaturated Magnesium Solid Solutions.) Walter Bulian and Eberhard Fahrenhorst. *Zeitschrift fuer Naturforschung*, v. 1, May 1946, p. 263-267.

The temperature of precipitation from Mg-Al solid solutions was found to be poorly defined. Annealing caused decomposition of Mg solid solutions with Th, Pb, Zn, Ag, Zn, Ca, Bi, and Mn. Structures formed by precipitating Mg-Al alloys with various elements and by annealing at different temperatures.

4d-18. Effect of Composition on Grain Growth in Aluminum-Magnesium Solid Solutions. Louis J. Demer and Paul A. Beck. *Metals Technology*, v. 15, June 1948, T.P. 2374, 16 pages.

As previously reported, isothermal grain growth in high-purity Al and in an Al alloy with 2% Mg can be adequately described by means of an empirical equation. In this paper, isothermal grain-growth data are presented for Al-Mg alloys with (Turn to page 14)

A portable spot welder made by **Miller Electric Mfg. Co. (637)** weighs only 23 lb. It will weld metal up to $\frac{1}{8}$ in. thick and has replaceable tips and tongs in 6, 12 and 18-in. lengths. (Literature available.)

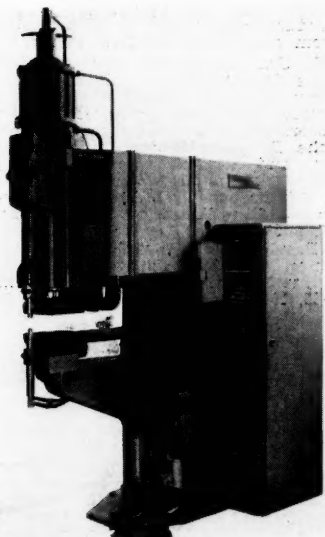


Miller Portable Spot Welder

A $7\frac{1}{2}$ -kva. bench-type spot welder is a new product of **Weldex, Inc. (638)**. It will handle light nonferrous metals of the same or dissimilar alloy and thickness, or ferrous metals up to two thicknesses of 14 gage. Standard throat depth is $4\frac{1}{2}$ in.

Power Supply and Resistance Welding Accessories

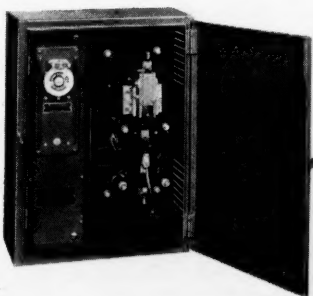
To help overcome power supply difficulties, **Taylor-Winfield Corp. (639)** is now producing Tri-Phase welders in spot, seam, projection and upset-butt types. These welders operate on a three-phase alternating current power supply line and produce a direct welding current output. Three-phase a.c. input is converted to d.c. output by the use of dry disk (metallic) rectifier units. Tri-Phase welders appreciably reduce the electrical power demand for three basic reasons: (a) The frequency in the weld-



Taylor-Winfield Tri-Phase Welder

er secondary circuit is reduced to zero (direct current); (b) the power demand is equally divided between all three phases of the power supply; and (c) the rectifier circuit is of the three-phase full-wave (not half-wave) type. (Literature available.)

Raytheon condenser Weldpower units work on a stored energy principle for welding light gages of wire and sheet metal. New models of the Freshman 200 m.f.d. and the Miniature 56 m.f.d. Weldpower units have been announced by **Raytheon Mfg. Co. (640)**. The Weldpower is electronically controlled and operates from a 115-volt lighting circuit. It delivers a high current at low voltage to the welding electrodes and provides a precise amount of energy to the weld. The level of energy delivered by the unit is adjustable over a range of $3\frac{1}{2}$ to 63 watt-sec. (Literature available.)



Square D Welder Controller

A combination welder controller developed by the **Square D Co. (641)** provides complete electrical control for a small foot or motor-operated resistance welding machine. The single enclosure contains a pneumatic weld timer, 100-amp., high-speed magnetic welder contactor, and a control transformer.

A new resistance welding alloy for seam welding is known as Mallory 22 Metal (**P. R. Mallory & Co., Inc.—642**). With high-conductivity copper as a base, it contains cadmium



Fluted Electrode by Mallory

and zirconium. Its hardness and resistance to annealing, as well as high conductivity, make it suitable not only for coated metals such as galvanized iron and terne plate, but for ordinary carbon steel as well.

Mallory has also announced an improvement in the design of resistance welding electrodes (**643**). Internal fluting inside the water hole provides better than 70% more water cooling area, materially increases the strength and rigidity of the electrode, and automatically centers the water-cooling tube. (Literature available.)

A third resistance welding accessory announced by **Mallory** is a new leakproof, ejector-type, light-duty holder (**644**). It is so arranged that the water circuit forces water against the head of the electrode tip regardless of length, and the water circuit is sealed so that there is no leakage to cause rust on the work.

Ampco Metal, Inc. (645) has also introduced a newly designed water-cooled ejector-type holder for spot welder tips. Tips are ejected easily with a light tap on the head. Sir-vene rubber is used to make a leak-proof, replaceable water seal.

Arc Welding Electrodes

The introduction early this year of "Carpenter Stainless 20" in wrought form (see *Metal Progress* for February 1948, page 224) introduced new possibilities in fabrication of this material, which is designed especially to resist sulphuric acid. To bring the advantages of arc welding to the fabricator, the **McKay Co. (646)** has developed a specialty electrode known as the McKay Stainless 20.

As shown by the adjoining table, the new electrode closely duplicates the composition of the alloy itself. Ultimate strength, yield strength and elongation are also comparable to the parent metal.

(Turn to page 15)

Composition of Weld in Carpenter Stainless 20

	Weld Metal	Parent Metal	Carpenter Specification
Carbon	0.045%	0.049%	0.07% max.
Manganese	0.90	0.92	0.75
Silicon	1.22	1.08	1.00
Phosphorus .....	.....	0.010	.....
Sulphur .....	.....	0.010	.....
Chromium	19.10	20.20	20.00
Nickel	28.20	28.90	29.00
Molybdenum	2.46	2.46	2.00 min.
Copper	3.47	3.47	3.00 min.

For Bulletins and Further Information, Use Reader Service Coupon on Page 17

0.025, 0.12, and 1.8 to 2.05% Mg, from 350 to 600° C., and for 20 sec. to 11 days.

4d-19. Solubility of Iron in Solid Aluminum. J. K. Edgar. *Metals Technology*, v. 15, June 1948, T.P. 2389, 5 pages.

Solubility was determined using 99.99% + Al. Data show that solubility decreases from 0.052% at the eutectic temperature (655° C.) to 0.006% at 500° C. It was also found that the Al-Fe alloys are not subject to precipitation hardening after solution heat treatment at 600 and aging at 250° C.

4d-20. Internal Friction in the Interstitial Solid Solutions of C and O in Tantalum. T'ing-Sui Ke. *Physical Review*, v. 74, July 1, 1948, p. 9-15.

Some internal-friction measurements from which it was concluded that C and O form interstitial solutions with tantalum. This observation is the first evidence that oxygen forms an interstitial solid solution with a metal. Location of C and O in the tantalum lattice.

4d-21. Stress Relaxation by Interstitial Atomic Diffusion in Tantalum. T'ing-Sui Ke. *Physical Review*, v. 74, July 1, 1948, p. 16-20.

Theoretical analysis of relaxation phenomena and experimental tests to determine relaxation strength by rigidity measurements and stress relaxation measurements.

For additional annotations indexed in other sections, see:

6b-70; 6d-15; 8-151; 11-185; 27b-36



POWDER METALLURGY

5a—General

5a-35. Comportement des poudres sous l'action de la pression. (Behavior of Pulverized Substances Under Pressure.) Rene Lecuir. *Comptes Rendus (France)*, Jan. 12, 1948, p. 191-193.

Pressure tends to cause the formation of agglomerates having an oriented structure, provided that air inclusions do not interfere. Such orientation may be modified by the flow of the material.

5a-36. Nickel-Iron Alloy Dust Cores. S. E. Buckley. *Electrical Communication*, v. 25, June 1948, p. 126-131. Reprinted from "Symposium on Powder Metallurgy," Iron and Steel Institute, London, May 1947, p. 59-63.

Development and properties for use in telecommunications equipment. Variation of permeability with magnetizing field for sheet and for various powdered-alloy cores, and also other electrical properties. Relationship to structure. 10 ref.

5a-37. Sintering in the Presence of a Liquid Phase. F. V. Lenel. *Metals Technology*, v. 15, June, 1948, T.P. 2415, 19 pages.

In contrast to the mechanism of sintering of pure metal powders, sintering in the presence of a liquid phase cannot be treated as one uni-

fied mechanism because there are really several mechanisms depending upon the type of alloy system and the field of its constitutional diagram in which the sintering takes place. The situation in which the liquid is present during the entire time while the compacts are at sintering temperature, and that in which the liquid phase is formed during sintering, but disappears before sintering is completed, by diffusion and solid-solution formation. Microstructural and density changes taking place. 69 ref.

5a-38. Die Reaktionsfähigkeit fester Stoffe und deren Wert für die Pulvermetallurgie. (The Reactivity of Solids and Its Importance in Powder Metallurgy) J. A. Hedvall. *Archiv für Metallkunde*, v. 1, July-Aug. 1947, p. 296-298.

A general discussion based on available literature. Effects of various factors such as temperature, magnetic and electrical conditions, ultrasonic vibration. 11 ref.

5a-39. Die Löslichkeitsregel in der Metallkeramik. (Solubility Rules for Powder-Metal Compacts). H. Umstätter. *Archiv für Metallkunde*, v. 1, July-Aug. 1947, p. 299.

Substances dissolve each other more readily the more nearly alike are their thermal vibration frequencies. The importance of this rule in the production of powdered metal compacts.

5a-40. Die "Konstruktion von Legierungen" als metallkeramisches Problem. ("Construction of Alloys"—A Powder Metallurgy Problem.) G. Ritzau. *Archiv für Metallkunde*, v. 1, July-Aug. 1947, p. 305-307.

Theoretical analysis indicates possibility of preparing combinations by sintering techniques whose constitution diagram prohibits production by melting and casting.

5a-41. Sinterverbundstoffe aus Metallen und nichtmetallischen Stoffen, vorzugsweise Oxiden. (Sintered Combinations of Metals and Nonmetals, Especially Oxides). F. Skaupy. *Archiv für Metallkunde*, v. 1, July-Aug. 1947, p. 307-308.

The development of powdered-metal compacts, ceramic bodies, and their combinations. The two main groups of metal-ceramic compositions, and important factors in their production.

5a-42. Die Entwicklung der metallkeramischen Lager. (Development of Powdered-Metal Bearings.) F. Eisenkolb. *Archiv für Metallkunde*, v. 1, July-Aug. 1947, p. 345-352.

Properties, advantages, and uses; methods of finishing bearing surfaces; effects of type of powder and of lubrication on efficiency of bearings; methods of testing the bearings. Three principal methods for producing the bearings. 22 ref.

5a-43. Die Metallkeramischen Werkstoffe im Gleitlagerbau. (Powder-Metal Compacts for Bearings.) St. Fronius. *Archiv für Metallkunde*, v. 1, July-Aug. 1947, p. 352-356.

Effect of powder size and shape on porosity and frictional properties of powdered-metal bearings. Emphasizes effects of method of production, of porosity, and of specific weight on quality of the finished bearing. 21 ref.

5a-44. Ueber die Metallpulvererzeugung nach dem Hamettag-Verfahren. (Production of Powdered Metals by the Hamettag Process.) Helmut Kramer. *Metall*, Nov. 1947, p. 73-76.

New type of mill pulverizes by means of "whirling impact." The principle of self-crushing has been perfected to such an extent in the new mill that crushing as a result

of wear of the mill parts is less than 1% of the total crushing.

5b—Ferrous

5b-23. Particle-Size Distribution in Powder Metallurgy. *Journal of the Franklin Institute*, v. 245, June 1948, p. 517-520.

Investigation of conditions contributing to lack of reproducibility in sieve analyses of metal powders.

5b-24. Making Wheels for Toy Locomotives. *Machinery* (London), v. 72, June 17, 1948, p. 735-736.

Wheels for toy locomotives are pressed from powdered iron on a standard Stokes 19-station rotary press.

5b-25. Zur Technologie des Sinter Eisens. (Technology of Powdered Iron.) H. Wiemer. *Archiv für Metallkunde*, v. 1, July-Aug. 1947, p. 323-326.

Effect of powder structure and density on mechanical properties of cold pressed sintered soft iron. From graphs of carbon content (up to 1%) vs. density, approximate tensile strength, elongation and Brinell hardness of a powdered-iron compact can be determined. Tensile strength and hardness can be considerably increased by heat treatment. Fatigue strength approximates that of light-metal alloys.

5b-26. Über die Gewinnung von Eisenpulver und seine Verwendbarkeit. (Production and Use of Iron Powder). F. Eisenkolb. *Archiv für Metallkunde*, v. 1, July-Aug. 1947, p. 327-335.

Different methods for pulverizing iron and steel; methods of classification; required compressibility of the powder; and strength of the finished product. Various present and potential uses. Experimental data. 21 ref.

5b-27. Herstellung von Eisenpulver für Sinterkörper aus reinsten Eisenkonzentrat. (Production of Iron Powder for Sintered Bodies From Very Pure Iron Ore Concentrates.) W. Luyken and H. Kirchberg. *Archiv für Metallkunde*, v. 1, July-Aug. 1947, p. 335-345.

Magnetite ores from northern Sweden, when concentrated and reduced to powder, were suitable for powder metallurgy. The samples were concentrated to about 72% Fe, before reduction in hydrogen at 600-650° C. The properties of the products were equal to those made from other iron powders. 10 ref.

5b-28. Untersuchungen über die Abnahme des Gehaltes von Kohlenstoff, Schwefel- und Sauerstoff während des Sinterns von Eisenpulver in einer Wasserstoffatmosphäre. (Investigation of the Decrease in the Carbon, Sulphur, and Oxygen Content During Sintering of Iron Powder in a Hydrogen Atmosphere.) G. F. Hüttig. *Archiv für Metallkunde*, v. 1, July-Aug. 1947, p. 359-361.

Previously abstracted from translation in *Powder Metallurgy Bulletin*, v. 2, Sept. 1947, p. 80-84. See item 5-65, 1947.

5c—Nonferrous

5c-21. From Research to Production; the Development of Copper-Lead Sintered Bearings. W. H. Tait. *Metal Industry*, v. 72, June 25, 1948, p. 521-523. (A condensation).

The art of developing a metallurgical idea from its initial conception to ultimate testing in practice is illustrated by the development of a bearing material with the good properties of the white metals and the fatigue strength of cast Cu-Pb. **5c-22. Entwicklung eines warm- und feuerfesten Werkstoffs mit niedrigem** (Turn to page 16)

McKay Stainless 20 electrode has good operating characteristics. The arc is steady and the slag under complete control. Direct current should be used, ranging from 45 to 65 amp. for a 3/32-in. electrode, and 180 to 200 amp. for a 3/16-in. size.

Westinghouse Electric Corp. (647) has 27 new Flexarc stainless steel electrodes covering the complete range of types and diameters required for all commercial grades of chromium-nickel and straight chromium steels. They are produced in two types—those with a combination titania-lime coating suitable for welding with a.c. and d.c. reverse polarity, and those with a straight lime coating for welding with d.c. reverse polarity only.

Graydac electrode A.W.S. E 6013 has been developed by **Champion Rivet Co. (648)** to meet the demand for a rod which has high burn-off rate, low spatter, easy slag removal and ease of operator manipulation. It can be used on all thicknesses of steel, in all positions, and with either a.c. or d.c. current. Deposited metal has good ductility and is free of gaseous or slag inclusions. Welds are smooth, flat and finely rippled. (Literature available.)

The new Airco No. 387 all-position electrode for mild steel is in the E 6012 class (**Air Reduction Sales Co.—649**). Smooth bead, minimum spatter and easy slag removal are a few of the quality features.

A brand-new electrode for welding cast iron is named Softweld by its manufacturer, **Lincoln Electric Co. (650)**, since it produces a soft, machinable deposit with a minimum of porosity. Of the nonferrous type, it is so designed that the weld will flow over and bond to the cast iron with a minimum of penetration and heating of the base metal. Thus the tendency to porosity is reduced, and the weld area may be machined, sawed, drilled or tapped.

Westinghouse Electric Corp. (651) has also brought out two new Flexarc electrodes for cast iron—namely, Castingweld and Freemachineweld. Castingweld uses a mild steel core wire and a special low melting point coating that overcomes difficulties with entrapped slag. The deposit is relatively hard and therefore not machinable. Freemachineweld uses a pure nickel core wire and is extruded with a special coating.

A nickel-cored electrode for making machinable welds on cast iron is also a new product of **All-State Welding Alloys Co., Inc. (652)**. One of its outstanding features is freedom from spatter.

A new silicon bronze electrode has been announced by **Air Reduction Sales Co. (653)**. In addition to the welding of silicon bronze, it can be used on copper and for joining galvanized iron and silicon bronze to steel. It produces a soft spray-type, shielded-arc action.



Welds Made With Champion Graydac Electrode

For those interested in welding of alloy castings, **Arcos Corp. (654)** has published a technical data sheet giving analyses of 11 electrodes for fabrication and salvage of both high and low-alloy castings. Corrosion and heat resisting alloys are included. Tensile properties and weld metal compositions are tabulated.

A wall chart is available from **Welding Equipment and Supply Co. (655)** covering Eureka tool and die welding electrodes and Eureka alloy welding electrodes. The chart designates each type of electrode, with its characteristics, recommended uses, sizes available, properties of welds produced and color code.

Hard Surfacing

Four new hard facing electrodes of the coated tubular type are being put on the market by **Lincoln Electric Co. Tungweld C (656)** contains in the tube coarse particles of tungsten carbide. As the weld solidifies, these particles are held in a tough iron alloy matrix. When the edge of the deposit is subjected to abrasive wear, the teeth-like particles of tungsten carbide are exposed, thus producing a self-sharpening edge. It is particularly recommended for surfacing earth-cutting tools. Tungweld F (657) contains fine rather than coarse particles of tungsten carbide. It produces a smoother, thinner and sharper edge than Tungweld C.

The other two **Lincoln** electrodes are Faceweld No. 1 (658) and Faceweld No. 12 (659). They deposit a chromium carbide alloy surface, for hard facing parts of plain carbon, low-alloy or manganese steel. Hardness of a single layer of Faceweld No. 1 is Rockwell C-40 to 52; of multiple layers, C-52 to 60. Faceweld No. 12 is designed for service where the surface must withstand extremely severe abrasion as well as some impact. The deposit is harder but not so tough as that of No. 1.

Page Steel and Wire Division (660) has a special manganese-nickel electrode for surfacing equipment subject to abrasive wear and shock. They are the first Mn-Ni electrodes to be

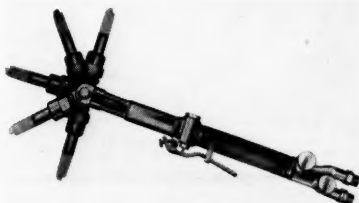
coated by the extrusion process. Because of this coating and the special analysis of the core wire, their weldability characteristics are similar to those of a mild steel electrode. (Literature available.)

Excelloy is the name of a hard overlay metal marketed by **Allied Steel Products, Inc. (662)**. Its low melting point of 1975° F. makes for ease of application and minimizes danger of damaging the base metal.

Gas Welding

The Airco 800—**Air Reduction Sales Co.'s** latest model of oxy-acetylene welding torch (663)—has a wide operating range, although it weighs only 1½ lb. and measures only 11½ in. long. It has capacity to operate single-flame welding tips from No. 0 to 13, and multiflame tips up to No. 15; thus, it is suitable for almost any welding job from the thinnest sheet metal up to 1½ in. in thickness.

Now in production by **Weldit, Inc. (664)** is the Model 160—a three-hose torch, using two tanks of acetylene and one of oxygen. It is 51 in. long and weighs 6 lb., 12 oz. Uses are for welding, heating or brazing broken parts, expanding tierods, bending large diameter pipe and other rugged maintenance work. An instantaneous and automatic oxygen cut-off is a particular feature.



The Hamilton Cristorch

Cristorch, the new welding and cutting torch introduced by **Hamilton Tool Co. (665)** has a flexible head that can be revolved through an arc of 180°. It will cut metal from 1/32 to 4 in. thick, and will cut holes and circles from 3/8 to 30 in. in diameter with an accuracy within 1/64 in. It cuts countersunk holes and bevels one or both sides of a straight cut in a single operation.

K-G Welding and Cutting Co.'s line of equipment has been improved as to eye-appeal and expanded by the addition of several items to help diversify applications (666). Examples are a multiple-hole heating tip and a cutting tip with a monel skid collar. (Literature available.)

The latest development by **Eutectic Welding Alloys Corp. (667)** is Eutec-Rod 1805FC for welding and brazing of copper. This new brazing-type alloy combines low bonding heat with high strength and ability to with-

(Turn to page 17)

spezifischem Gewicht. (Development of a Heat and Fire Resistant Material of Low Specific Gravity.) J. Bingle. *Archiv für Metallkunde*, v. 1, July-Aug. 1947, p. 309-311.

Properties of two powder compositions containing 84 and 88% SiC, respectively. Addition of Fe, Co, or Ni reduces the sintering temperature of the carbide far below its melting point, while the melting metal simultaneously increases the strength of the compact.

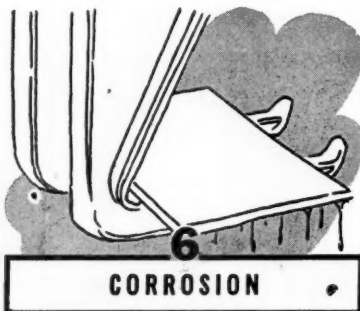
5c-23. Zu der metallkeramischen Verarbeitung von Zinkpulver. (Powder Metallurgy of Zinc.) W. Wolf. *Archiv für Metallkunde*, v. 1, July-Aug. 1947, p. 363-368.

Effects of adding different amounts of graphite and copper (up to 4%) on mechanical properties of powder compacts.

5d—Light Metals

5d-2. Über Synthetische Körper aus Leichtmetallen. (Synthetic Light-Metal Products.) F. Sauerwald. *Archiv für Metallkunde*, v. 1, July-Aug. 1947, p. 363-368.

Production of powdered-metal products from aluminum and magnesium and their alloys, which is difficult because of the presence of oxide films. German patents. Extrusion improves working properties. The applicability of common Al and Mg scrap; corrosion resistance of pure Mg.



6a—General

6a-58. Über die Abhängigkeit der atmosphärischen Korrosion der Metalle von den schwefelhaltigen Verunreinigungen der Luft. (Dependence of the Atmospheric Corrosion of Metals on the Sulphur-Containing Impurities in the Air.) Gerhard Schikorr. *Metall-oberfläche*, v. 1, May 1947, p. 115-116.

Al, Pb, Zn, Cu, Ni, Mg, and Fe were found to corrode at rates dependent on the sulphur contamination of the air.

6a-59. Station Design and Material Composition as Factors in Boiler Corrosion. R. B. Donworth. *American Society for Testing Materials, Preprint No. 106*, 1948, 8 pages.

Physical relationship of the materials and the influence of design on both corrosion and erosion and the subsequent carrying of the products into the boiler.

6a-60. An Investigation of Fretting Corrosion Under Several Conditions of Oxidation. B. W. Sakmann and B. G. Rightmire. *National Advisory Committee for Aeronautics Technical Note No. 1492*, June 1948, 57 pages.

Results of tests on fundamental mechanism of the phenomenon observed at contact surfaces subject to vibration, for various materials, including steel, phosphor-bronze, tin, aluminum, aluminum alloys, lead, lead-plated steel, and chromium

steel, in air, in vacuum, in oxygen, and in helium under identical conditions of load and slip.

6a-61. Sulphuric Acid Versus Construction Materials. *Chemical Engineering*, v. 55, June 1948, p. 223-224, 226, 228, 230, 232.

Part II of a symposium in which typical materials of construction are evaluated for services involving sulphuric acid. Precious Metals, by E. F. Rosenblatt; Durimet, by Walter A. Luce; and Carbon, Graphite, by W. W. Palmquist.

6a-62. Corrosion Costs in the Petroleum Industry. F. A. Rohrman. *Petroleum Engineer*, v. 19, June 1948, p. 115-116, 118, 120.

Factors in corrosion control and economic aspects.

6a-63. Stress-Corrosion and Corrective Measures. Mars G. Fontana. *Metal Progress*, v. 53, June 1948, p. 838-840.

In last of a four-part article on "The Eight Forms of Corrosion". One of the most puzzling and hard-to-handle manifestations of corrosion.

6a-64. Stress Corrosion. J. C. Chaston. *Nature*, v. 161, June 5, 1948, p. 891-892.

Possible mechanisms which cause season-cracking in brass and similar alloys.

6a-65. Electronic Tracing of Polarization Curves. Part I. Instrumentation. Glenn A. Marsh and Hugh J. McDonald. *Corrosion and Material Protection*, v. 5, May-June 1948, p. 11-14. (*Journal of Corrosion*, p. 1-4.)

Circuit of an instrument designed to permit easy following of six polarization variables of interest in corrosion research.

6a-66. Practical Use of Chromate Inhibitors in Engine Cooling Systems. D. D. Wright. *Canadian Chemistry and Process Industries*, v. 32, June 1948, p. 533-535.

Control of corrosion in the cooling-water system of compressors. How chromate-treated steam condensate removes all danger of scale formation, removes scale already present in the engine, and increases the expected life of piping employed.

6a-67. Dry Corrosion Investigated at Pittsburgh Conference. *Chemical and Engineering News*, v. 26, June 28, 1948, p. 1901.

Proceedings of International Conference on Surface Reactions, Mellon Institute, June 6 to 11, 1948. Among those present were representatives of laboratories in England, France, Germany, Holland, Sweden, and Switzerland. Much of the discussion centered about the mechanism of dry corrosion.

6a-68. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry*, v. 40, July 1948, p. 73A-74A.

Materials of construction for making and handling acetic acid and actual plant problems.

6a-69. Motor Oils—1948. J. C. Geniesse and J. F. McGrogan. *Oil and Gas Journal*, v. 47, July 8, 1948, p. 67-68, 71-73.

Methods for evaluating motor oils, and performance of rust inhibitors and detergents. Effects of these ingredients on engine parts.

6a-70. The Resistance of Alloys to Corrosion During the Processing of Some Foods. J. F. Mason, Jr. *Corrosion*, v. 4, July 1948, p. 305-320.

Results of corrosion tests in the handling and processing of food-stuffs. Only material not previously published by International Nickel Co. Data for a variety of metals and alloys.

6a-71. Alloying Steels for Corrosion Resistance to Gas-Condensate Fluids. Part 2. C. K. Ellerts, Faye Greene, F. G. Archer, Betty Hanna, and L. M.

Burman. *Corrosion*, v. 4, July 1948, p. 321-356; discussion, p. 356-357.

Data for carbon steels, Cr steels, Ni steels, Cr-Ni steels, Cu-Ni steels, other Cu-Ni alloys, and plated steels. Effect of sodium chloride on rate of corrosion of alloy steels; composition of metals and tendency toward wetting by the condensate; and susceptibility to corrosive attack by well-treating acid. 14 ref.

6a-72. Corrosion by Molten Materials. Part I. F. R. Morral. *Wire and Wire Products*, v. 23, June 1948, p. 484-489.

A compilation, in tabular form, of data from the literature. 31 ref. (To be continued).

6a-73. The Work of the Corrosion Committee of the British Iron and Steel Research Association. *Paint Technology*, v. 150, June 1948, p. 232-233.

Remarks by T. M. Herbert, by J. C. Hudson, and general discussion.

6a-74. Verhalten von metallischen Werkstoffen Gegenüber sehr verdünnten, wässrigen Lösungen. (Behavior of Metals in Very Dilute Aqueous Solutions.) L. W. Haase. *Archiv für Metallkunde*, v. 1, June 1947, p. 259-264.

The factors responsible for waterworks corrosion. Deals with both ferrous and nonferrous metals and alloys.

6a-75. Über die lösungsvermindernde Wirkung der Nikotinsäure (β -Pyridin-karbonsäure) auf Metalle. (The Inhibiting Effect of Nicotinic Acid (β -Pyridine Carboxylic Acid), on the solubility of Metals.) L. Hertelendi. *Archiv für Metallkunde*, v. 1, June 1947, p. 275-278.

Nicotinic acid was found to decrease the rate of solution of metals in mineral acids. The inhibiting effect varies with different solutions and different metals, and no protective film is formed. 11 ref.

6b—Ferrous

6b-64. Corrosion of Metals by Hydrochloric Acid at High Temperatures. (In Russian.) Kh. L. Tseitlin. *Zhurnal Prikladnoi Khimii* (*Journal of Applied Chemistry*), v. 21, Jan. 1948, p. 35-41.

A mixture of HCl and H₂O attacks boiler steel only slightly at 140 to 500° C. At 300 to 500° C., stainless Cr steel "EZh27" is more resistant than plain boiler steel. Cast iron at 200 to 310° C. is quite resistant. At high temperatures, dry HCl attacks steel more vigorously than the HCl-H₂O mixture.

6b-65. La passivité des aciers inoxydables et les phénomènes d'adsorption. (Passivity of Stainless Steel and the Phenomenon of Adsorption.) Louis Guillon. *Comptes Rendus (France)*, v. 226, March 8, 1948, p. 805-807.

Previously abstracted from *Métallurgie & Corrosion*, v. 23, Feb. 1948, p. 29-33. See item 6b-52, 1948.

6b-66. Factors of Importance in the Atmospheric Corrosion Testing of Low-Alloy Steels. H. R. Copson. *American Society for Testing Materials, Preprint No. 20*, 1948, 17 pages.

Presents data which show that results depend on location, on duration of tests, on manner of exposure, on method of estimating corrosion, and on weather. 28 ref.

6b-67. Laboratory Corrosion Tests of Iron and Steel Pipes. G. A. Ellinger, L. J. Waldron, and S. B. Marzolf. *American Society for Testing Materials, Preprint No. 21*, 1948, 10 pages.

Results of tests of ten types over periods extending up to ten years in contact with Washington, D. C., tap water continuously circulated through columns of the test samples.

(Turn to page 18)

stand cold working or hammering to shape.

Another noteworthy feature is the flux coating of Eutectic low-temperature welding rods for use with a torch (668). The following types are now available with a strong, adherent flux coating: 14FC for cast iron; 16FC for steel, 18FC for brass, bronze and copper; 184FC for copper; 210FC for aluminum; 21FC for aluminum sheet and tubing; 185FC for overlay and bronze welded joints; 20FC for nickel and 183FC for copper.

Brazing and Soldering

A new furnace brazing technique for joining high-temperature stainless steel parts comes from the laboratories of **General Electric Co. (670)**. By using an exceptionally pure hydrogen atmosphere, oxidation of the chromium is prevented. (Fluxes have been used for this purpose in the past, but the cost and time for removing them are excessive.) The parts are sealed in a box, which is then filled with pure hydrogen. The box is heated in an electric furnace for 20 min. to an hour, and then allowed to cool. In the cooling chamber, the hydrogen is exhausted and replaced by nitrogen, which is not explosive when mixed with air.

As a companionpiece to its rosin-filled solder, **Alpha Metals, Inc. (671)** has recently introduced Tri-Core Leakpruf acid-filled solder. Although only half as corrosive as zinc chloride, the solid acid flux will solder such metals as stainless steel, nickel and monel—in fact, any metal except aluminum and magnesium. A definite soldering sequence is automatically developed by three cores of flux. The three-core construction also promotes faster melting.



LIQUID FLUX CORE



DIVCO SEMI-SOLID FLUX CORE

Division Lead Co. (672) has also introduced an acid core solder under the trade name of Divco. A heavy creamlike flux, it remains solid and will not run out at normal temperatures. It does not take on moisture from the air.

A rub-on solder for aluminum that can be applied at temperatures still lower than the company's previous line of low-temperature welding and brazing alloys is now available from **All-State Welding Alloys Co., Inc. (673)**. It is applied without flux, and is recommended for filling and soldering where tightness is essential but

strength is unimportant. It is used for the repair of blowholes, for building up worn surfaces on aluminum castings, and for salvaging and making changes on foundry patterns.

All-State has also announced the Kromover touch-up pencil for tinning (674). It will tin oil-impregnated bronzes, burned cast iron, all stainless steels, and black iron without removing mill scale. The protective coating formed by the pencil is corrosion resistant and, unlike tin plating, it sacrifices itself to protect the iron or steel on which it is applied.

Positioners and Miscellaneous

A new line of improved turning rolls for welding tanks, drums, and pressure and cylindrical vessels of all types is described by **Ransome Machinery Co. (675)**. Notable features are antifriction bearings in both power and idler rolls in the larger sizes, and a lowered drive to make it easier to load and unload the rolls from either end. A new and exclusive feature is the combination steel and bronze worm wheel. A steel hub reinforces the bronze rim against stresses resulting from heavy loads. (Literature available.)

A novel feature of a new welding positioner designed by **Harnischfeger Corp. (676)** for brazing refrigerator cooling coils is a self-leveling table on the top for the operator to stand on. The operator can rotate and change the angle of tilt of the coil from the table by a push-button control. The system also controls power elevation of the table and operator.

A welding helmet weighing only 19 oz. and with all the protective advan-



Willson Welding Helmet

tages of more expensive models has been announced by **Willson Products Inc. (678)**. A special formula lens available in 12 different shades has a clear cover glass to protect the welding glass from pitting. The helmet is made in one piece from tough, dense, vulcanized fiber.

For bonding metal to metal, **Minnesota Mining & Mfg. Co. (679)** has developed Scotch-Weld Bonding Film—an adhesive that resists shear tests up to 3500 psi. It is a pure adhesive with no supporting material in the film, is transparent, and not tacky to the touch. The film is placed between units to be bonded and is cured by simultaneous application of heat and pressure—300 to 500° F. for 5 to 60 min., and a pressure of 25 to 100 psi., varying with the type of bond desired.

READER SERVICE COUPON

Check These Numbers for Production Information and Manufacturers' Catalogs. These following numbers refer to the new products and bulletins listed in the article on "Welding Supplies" starting on page 9.

THIS COUPON IS VOID AFTER NOV. 15, 1948

Metals Review, August, 1948

617	622	627	633	638	643	648	653	658	664	670	675
618	623	629	634	639	644	649	654	659	665	671	676
619	624	630	635	640	645	650	655	660	666	672	678
620	625	631	636	641	646	651	656	662	667	673	679
621	626	632	637	642	647	652	657	663	668	674	

YOUR NAME

COMPANY

TITLE

STREET

CITY AND ZONE

MAIL TO METALS REVIEW, 7301 EUCLID AVE., CLEVELAND 3, OHIO

(17) AUGUST, 1948

6b-68. Atmospheric Durability of Steels Containing Nickel and Copper—Additional Exposure Data. N. B. Pilling and W. A. Wesley. *American Society for Testing Materials, Preprint No. 23*, 1948, 8 pages.

Observations at the end of 22 years of exposure. The advantage of Ni-Cu steels over Cu steels is becoming more evident. Effects of P, Si, Mn, and C were also evaluated.

6b-69. Control of Metal Corrosion. W. T. McClenahan. *Journal, American Water Works Association*, v. 40, June 1948, p. 606-614.

The occurrence, the probable causes, and the cures of metal corrosion or metal failure in the works of the Chicago Sanitary District.

6b-70. Effects of Hydrogen in the Corrosion of Steel. *Iron Age*, v. 161, June 17, 1948, p. 93-94. Condensed from paper by M. H. Bartz and C. E. Rawlins.

Previously abstracted from full paper in *Corrosion*, v. 4, May 1948, p. 187-206. See item 6b-45, 1948

6b-71. Corrosion: Its Effect in Boiler Systems. Part II. Robert L. Reed. *Combustion*, v. 19, June 1948, p. 43-49.

Corrosion by CO₂, NH₃, and H₂S; acidity; and certain physical factors. Corrective measures for each.

6b-72. NBS Tests Reveal Value of Cathodic Protection. *Industry and Power*, v. 55, July 1948, p. 100.

Previously abstracted from *Journal of Research of the National Bureau of Standards*, v. 40, April 1948, p. 301-313. See item 6b-42, 1948.

6b-73. Oxynitration of Benzene to Picric Acid; Wolffenstein-Böters Reaction. E. E. Aristoff and others. *Industrial and Engineering Chemistry*, v. 40, July 1948, p. 1281-1290.

Information on corrosion of the Duriron reactor during this reaction. 32 ref.

6b-74. Cathodic Protection of Steel in Sea Water With Magnesium Anodes. R. A. Humble. *Corrosion*, v. 4, July 1948, p. 358-370.

Objectives of the research were selection of the most suitable magnesium alloy and a study of minimum current requirements under varying conditions of exposure. Anodic performance of various magnesium alloys and reactions which take place at the cathode.

6b-75. Test of Nickel Plated A.P.I. Type Joint in Flow Line of Corrosive Distillate Well. B. B. Morton. *Corrosion*, v. 4, July 1948, Supplement, 1-3.

Threading of the coupling and that of the pipe, as well as its interior were nickel plated to a depth of about 6 to 8 mils. A part of the nickel had been removed from the chamber of the pipe prior to its assembly into the coupling. Severe galvanic corrosion was expected but not observed. It was concluded that rupture of a nickel-plate coating in a condensate well of the type studied will not result in as serious attack as has been previously anticipated. It is also believed that a thin coating of nickel will be adequate to protect the pipe threads.

6b-76. Basic Principles of Corrosion Control by the Use of Lime. Edward S. Hopkins. *Paper Trade Journal*, v. 127, July 1, 1948, p. 61-63.

Principles of corrosion of iron and steel water pipe as a function of the dissolved oxygen. Neutralization of free CO₂ in low alkaline waters by lime and the subsequent precipitation of a calcium carbonate-ferrous oxide coating on pipe surfaces retards corrosion to the point of practical elimination. 11 ref.

6b-77. Crystal Structure of Iron Scale. Part IV. Investigation of the "Inter-

mediate" Temperature Range. (In Russian.) V. I. Arkharov and F. P. Butra. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 211-214.

Investigation showed that the scale formed at high temperatures has a structure directly dependent on the mechanism of oxidation. This mechanism was studied between 500 and 850° C., on the basis of the different scale compositions and structures formed.

6b-78. Combating Corrosion of Iron and Steel. *Metallurgia*, v. 38, June 1948, p. 104-106.

Scope and practical character of the work of the corrosion committee of the British Iron and Steel Research Association. 23 ref.

6b-79. Prevention of Corrosion in Refinery Heat-Exchanger Equipment. M. A. Furth. *Petroleum Refiner*, v. 27, July 1948, p. 129-134.

Various preventive methods; design details; performance under service conditions.

6b-80. Mineral Wool Cement Helps Lick Tank Roof Corrosion in Tropical Climate. *Petroleum Refiner*, v. 27, July 1948, p. 138.

Use of above to prevent H₂S corrosion on the Texas Gulf coast.

6b-81. Der Einfluss der Oxydhaut auf die Korrosionsgeschwindigkeit, insbesondere des Eisens. (The Effect of the Oxide Film on the Rate of Corrosion, Especially of Iron.) F. Tödt. *Archiv für Metallkunde*, v. 1, June 1947, p. 249-251.

Includes several protective-coating methods.

6b-82. Über den Einfluss von Sparbeizen und anorganischen Stoffen auf die Korrosion von Eisen in Warmwasser. (The Effect of Inhibitors and Inorganic Matter on the Corrosion of Iron in Warm Water.) W. Machu. *Archiv für Metallkunde*, v. 1, June 1947, p. 267-270.

Effects of various inhibitors and oxidants on the solubility of iron in water at 60° C.

6b-83. Metallschwund und Katalyse. (Metal Solubility and Catalysis) K. Wickert. *Archiv für Metallkunde*, v. 1, June 1947, p. 270-275.

Iron dissolves more rapidly in a solution of NaCl or ZnCl₂ and oxygen than in distilled water with the same oxygen content. Data on this effect determined by use of an ionometer in terms of mv., which were then converted into pH values. The rate of iron solution varies with the type of electrolyte.

6b-84. Über den Schutz von Eisenteilen, die mit Seewasser in Berührung stehen, durch galvanische Berührung mit Zink. (Protection of Iron Parts in Contact With Seawater by Galvanic Contact With Zinc.) F. Tödt. *Archiv für Metallkunde*, v. 1, June 1947, p. 288-289.

Bauer and Vogel (Germany, 1942) found that 14 sq. cm. of zinc was necessary to protect 120 sq. cm. of iron in dilute salt solution, which is much too large an amount for practical application. However, the present author found that a zinc surface equal to only 0.1% of the iron surface was sufficient under certain conditions.

6c—Nonferrous

6c-19. Über die Korrosion von Fein-zink und Fein-zinklegierungen. (The Corrosion of High-Purity Zinc and Its Alloys.) L. W. Haase. *Metallüberfläche*, v. 1, April 1947, p. 73-77.

Electrochemical behavior of pure zinc and its alloys for use in water installations. Zinc alloys cannot be substituted for brasses and bronzes in handling water.

6c-20. Crystal Structure of Copper Scale. (In Russian.) V. I. Arkharov and Z. P. Kichigina. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 215-218.

Results of X-ray investigations of scale formed in air at 700, 800, 900, and 1000° C. for oxidation periods of 2 to 48 hr.

6c-21. An Electron Diffraction Study of Oxide Films Formed on Nickel-Chromium Alloys. J. W. Hickman and E. A. Gulbransen. *Metal Technology*, v. 15, June 1948, T.P. 2372, 15 pages.

Results of study made in an attempt to correlate structure with oxidation rates as determined by the vacuum microbalance, and with lifetime tests on heater elements. The 80%-Ni, 20%-Cr series appears most promising, and shows marked improvement as a result of Si additions. 11 ref.

6c-22. An Electron Diffraction Study of Oxide Films Formed on Copper-Nickel Alloys at Elevated Temperatures. J. W. Hickman and E. A. Gulbransen. *Metal Technology*, v. 15, June 1948, T.P. 2391, 13 pages.

Available literature on structures of Ni and Cu oxide films. Possibility that the mechanisms of corrosion and oxidation are different is suggested by the fact that no unique structural change was found at the composition where the Cu-Ni system approximates zero in magnetic susceptibility and becomes passive to corrosion. It is also believed that rates of formation and diffusion of ions are of importance in determining which oxide will be formed. 14 ref.

6c-23. Stress Corrosion of Manganese Bronze Castings. Thomas L. Sheehan and Howard E. Dickerman. *Foundry*, v. 76, July 1948, p. 82-87, 190, 192.

Previously abstracted from *Journal of the American Society of Naval Engineers*, v. 58, Nov. 1946, See item 6-147, R.M.L., v. 3, 1946.

6c-24. Electrical Contacts; The Effect of Atmospheric Corrosion. U. R. Evans. *Metal Industry*, v. 73, July 2, 1948, p. 10-13.

Investigations suggest that two entirely different types of corrosion product can be produced by atmospheric attack and that these two types affect electrical contact problems in different ways. 31 ref.

6c-25. Die Korrosion von Silber durch Brom. (Corrosion of Silver by Bromine.) R. Weiner. *Archiv für Metallkunde*, v. 1, June 1947, p. 281-284.

The corrosive effect of dry and wet bromine on refined silver. The product of corrosion is an adhesive film of silver bromide which, in the absence of impurities, prevents further corrosion. 11 ref.

6d—Light Metals

6d-15. Influence de l'orientation des contours de grains de l'aluminium de haute pureté sur leur attaque par l'acide chlorhydrique. (Influence of Orientation of the Shape of the Grains in High-Purity Aluminum on Attack by Hydrochloric Acid.) Nicolas Yan-naquis and Paul Lacombe. *Comptes Rendus* (France), v. 226, Feb. 9, 1948, p. 498-499.

Results of investigation indicated that the relative orientation of adjacent crystals does not influence their resistance to chemical attack at their points of contact. The shape of grains having a definite orientation is believed more important.

6d-16. The Dissolution of Aluminum in Sodium Hydroxide Solutions. Michael A. Streicher. *Journal of the Electrochemical Society*, v. 95, 1948, p. 1-10. (Turn to page 20)

A Salute to Alloy Steels

By Francis B. Foley*

President, American Society for Metals

Alloy steel will be the central theme of the 1948 Metal Congress. President Foley invites assistance in developing the program by suggesting names of individuals most deserving to receive the Distinguished Service Awards.

IT IS FITTING that the attention of all members and friends of the American Society for Metals be called, thus prominently, to the arrangements being made for the 30th National Metal Congress and Exposition (the annual meeting of A.S.M.) to be held in Philadelphia the week of October 25. It is fitting for several reasons.

In the first place, the members of the society, remembering a steady progression of successful conventions and expositions, have come to expect a noteworthy event as a matter of course. This fall, however, the national officers have completed preliminary plans for a meeting of special interest, with the theme "A Salute to Alloy Steel".

In the second place, the success of the Congress and Exposition depends as much—even more—on the membership of the A.S.M. as on the management.

This year the success of the Salute to Alloy Steel will require, in one important detail, the cooperation in advance of the members of the American Society for Metals. I refer to the first of the three special features now being arranged:

1. The selection of men in the U.S. and Canada who have made notable contributions to the progress and development of alloy steels, and the preparation of appropriate citations and Distinguished Service Awards.

2. A visualization—by appropriate exhibits on the main stage of the exposition building—of the part played by alloy steel in the history and development of our country, the progress of alloy steel through engineering, research and technology, and the dependence of the American economy on engineering alloy steel.

3. A program of technical and historical papers about alloy steel.

Eleven outstanding leaders in American industry have accepted appointments from the American Society for Metals to serve on the honorary committee covering the "Salute to Alloy Steel".

In addition to the society's president and vice-president, the honorary committee includes the presidents of eight national associations in the al-

loy steel consuming field and the presidents of the three largest steel producing companies. Complete personnel of the honorary committee is listed on page 21.

Distinguished Service Awards

An excellent committee has been appointed to determine the qualifications of candidates for the Distinguished Service Awards. J. M. Schlendorf, vice-president of Republic Steel

A.S.M. Annual Meeting

To the Members of the A.S.M.:

This is your official notice that the annual meeting of the American Society for Metals will be held in the ballroom of the Benjamin Franklin Hotel, Philadelphia, on Wednesday morning, 9:30 a.m., Oct. 27, 1948. All members of the Society in good standing are privileged to attend and vote.

W. H. Eisenman, Secretary
Cleveland, Ohio, Aug. 15, 1948.

Corp., is chairman, and Rufus E. Zimmerman, vice-president of U. S. Steel Corp., is vice-chairman. The personnel of the committee is listed in full on page 21. These men will judge the qualifications of candidates whose names are suggested to them.

Here is where the entire membership of the American Society for Metals can help. Let each one of you recall your experiences with alloy steels in the past; compare the early ignorance with present-day knowledge; write a letter giving the names of the people now living who, in your opinion, did an outstanding job in making this transformation possible; add what supporting remarks or evidence you think appropriate; and mail the letter to J. M. Schlendorf, chairman, Distinguished Service Awards Committee, Republic Building, Cleveland 1, Ohio.

The Awards Committee will consider nominations of outstanding men in all branches of this great field of engineering alloy steels. The stain-

less, toolsteels and other high-alloy steels are not considered to be in this category. The following outline is presented to stimulate concrete thinking:

I. Men who discovered, perfected and promoted the metallurgical processes

1. Ferro-alloys and other raw materials
2. Equipment and processes for making alloy steel
 - (a) Furnaces
 - (b) Auxiliaries
 - (c) Control equipment
 - (d) Refining processes and reagents
 - (e) Alloy steel ingot and steel casting practice
3. Forging and other mill processes adapted especially to alloy steels
4. Heat treating techniques for alloy steels

II. Discoverers of advanced research techniques

III. Discoverers of improved inspection techniques

IV. Discoverers and perfecters of the alloy steels themselves

1. Compositions
2. Control and refinement of microstructure

V. Notable men in the organization and promotion of the alloy steel business

VI. Men responsible for notable applications in consuming industries

1. Transportation industries
 - (a) Automotive
 - (b) Railroad
 - (c) Aircraft
 - (d) Marine
2. Agricultural Machinery
3. Power industries
 - (a) Steam
 - (b) Electrical
 - (c) Gas
 - (d) Water
4. Machine industries
5. Chemical and petroleum industries
6. Ordnance

A glance at this brief outline will indicate that the Distinguished Service Awards Committee will need a lot of help from all A. S. M. members.
(Turn to page 21)

*Superintendent of research, Midvale Co., Philadelphia.

trochemical Society, v. 93, June 1948, p. 285-316.

The effects of immersion time, temperature, concentration, and applied external current. A technique resulting in reproducible dissolution rates. It was found that the various phenomena observed may be explained in terms of electrochemical theory. 45 ref.

6d-17. Characteristics of Aluminum Make It Suited to Outdoor Reflector Use. W. Irby. *Materials & Methods*, v. 27, June 1948, p. 75-78.

Resistance to corrosion and discoloration and the high reflectivity of alclad, plus ease of fabrication, result in its use for outdoor lighting units.

6d-18. Protective Films; Natural Formation on Aluminum and Its Alloys. F. A. Champion. *Metal Industry*, v. 72, May 28, 1948, p. 440-442, 444; June 4, 1948, p. 463-464.

Results of researches carried out on corrosion-time curves of aluminum. It is shown that the corrosion follows an exponential law in all cases where film formation is possible. Under some conditions there may be an initial induction period.

6d-19. Über die Korrosion von Mg-Mn-Gusslegierungen und Halbzeugen. (Corrosion of Mg-Mn Cast Alloys and Semi-Finished Products.) A. Beerwald. *Archiv für Metallkunde*, v. 1, June 1947, p. 284-285.

About 0.9% Mn produces the maximum corrosion resistance. In contrast to pure magnesium and aluminum alloys containing Mg, iron (not exceeding 0.9%) has no effect on corrosion resistance.

For additional annotations indexed in other sections, see:

3b-86-88; 7b-114; 7c-31; 9a-44; 14b-82; 27a-96-97.



CLEANING and FINISHING

7a—General

7a-131. Sandstrahlbehandlung metallischer Oberflächen. (Finishing of Metal Surfaces by Sandblasting.) Fritz Wehrmann. *Metalloberfläche*, v. 1, March 1947, p. 56-57.

Design factors for sandblast equipment. Advantages of this method.

7a-132. Health Hazards of Metal Cleaning Compounds. (Concluded.) P. M. Van Arsdell. *Organic Finishing*, v. 9, May 1948, p. 20-25.

Toxicity of various alcohols, sulphonates, aniline, and miscellaneous organic and inorganic compounds.

7a-133. Painting Transformers. Walter Rudolph. *Organic Finishing*, v. 9, May 1948, p. 36-40.

Conveyerization of cleaning, bonderizing, and painting operations in making transformers.

7a-134. Finishing Clinic. Allen G. Gray.

METALS REVIEW (20)

Products Finishing, v. 12, June 1948, p. 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72.

Thickness measurements of plated coatings; coverage tests of finishing materials; spot test for detection of cadmium plate; nitrocellulose lacquers as finishing materials; and slot plating test cell.

7a-135. Barrel Finishing of Metal Products. Part 22. A Further Discussion of the Use of Minerals in Barrel Finishing Processes. H. Leroy Beaver. *Products Finishing*, v. 12, June 1948, p. 78, 80, 82, 84, 86.

7a-136. Practical Applications of Modern Products. *Products Finishing*, v. 12, June 1948, p. 88, 90, 92, 94, 96, 98.

Automatic buffing machine speeds finishing operations; Dow process for plating on magnesium; and acid resisting enamel range tops produced with one coat of porcelain enamel.

7a-137. Technique of Applying Attractive Finishes on Prefabricated Metal Partitions. H. W. Sacks. *Industrial Finishing*, v. 24, June 1948, p. 59, 62, 64, 67-68.

How mass-production finishing is accomplished in a custom shop.

7a-138. Metal-Coated Plastics Combine Advantages of Both Materials. H. R. Clauser. *Materials & Methods*, v. 27, June 1948, p. 79-82.

Metal coatings, applied by electroplating, vacuum deposition, and metal spraying provide special combinations of properties to meet both engineering and decorative needs.

7a-139. Polishing; Its Role in the Metal-Finishing Industry. W. L. Pinner. *Metal Industry*, v. 72, June 4, 1948, p. 460-462.

Previously abstracted from *Journal of the Electrodepositors' Technical Society*, v. 23, 1948, p. 95-100 (Reprint). See item 7a-124, 1948.

7a-140. Porcelain Enamel Versus Corrosion. Helen H. Smith. *Corrosion and Material Protection*, v. 5, May-June 1948, p. 8-9, 16.

Applications for chemical reactors and other industrial equipment exposed to severe corrosion.

7a-141. Polychrome Metallic Finishes. George Black. *Organic Finishing*, v. 9, June 1948, p. 11-15, 51.

Smooth and "textured" classes of organic coatings in which colors vary depending upon diffraction and reflection of light rays. This phenomenon is made possible by use of aluminum or aluminum-bronze flakes in the pigment composition.

7a-142. Progress of Fluxing in Hot Galvanizing. A. T. Baldwin. *Canadian Metals & Metallurgical Industries*, v. 11, June 1948, p. 23, 33.

Use of zinc ammonium chloride and nonaqueous fluxes. Factors to consider in a fluxing process.

7a-143. Advancements in Refrigerator Finishes. O. E. Norberg. *Refrigerating Engineering*, v. 55, June, 1948, p. 567-570; discussion, p. 570, 604-605.

Development of improved surface coatings and methods for their testing.

7a-144. Cleaning and Finishing. Arch B. Tripler, Jr. *Metals Review*, v. 21, June 1948, p. 3, 5, 7.

Past year's developments in cleaning, pickling, metal coatings, barrel finishing, polishing, buffing, grinding, anodizing, and coloring, with references to "A.S.M. Review of Current Metal Literature."

7a-145. Finishing Equipment. *Metals Review*, v. 21, June 1948, p. 9, 11, 13, 15, 17, 19, 21.

New products for metal cleaning, polishing, protective coating, and electroplating announced during the past year, as described by the manufacturers.

7a-146. Investigation of Spalling of Porcelain Enamel Caused by Syrup at Elevated Temperatures. E. D. Skillicorn. *Enamelist*, v. 25, June 1948, p. 9-13.

Spalling was investigated on a laboratory scale using test panels to simulate the service conditions which resulted in severe spalling in a heavy-duty oven used in a cafeteria when hot cherry juice was spilled on it. Data for five base metals, including copper, and 22 types of enamel.

7a-147. Metal Cleaning Processes. (Concluded.) V. Tanks, Sprays and Electrical Processes. L. Sanderson. *Chemical Age*, v. 58, June 5, 1948, p. 779-780, 788.

7a-148. Diphasic Metal Cleaners; Preferential Wetting by the Two Phases. Irving Reich and Foster Dee Snell. *Industrial and Engineering Chemistry*, v. 40, July 1948, p. 1233-1237.

Details of theoretical and experimental study of the surface action including: mechanism of wetting; interfacial angles for various systems; oil displacements by aqueous solutions; effects of soaps; effect of oleic acid; effects of soil type; and role of the surface.

7a-149. How to Paint the Product. Part I. H. E. Linsley. *American Machinist*, v. 92, July 15, 1948, p. 97-112.

First part of a two-part manual deals with preparing the surface of the various metals for painting; selecting and preparing the paint; and conventional and electrostatic spray painting. (To be concluded.)

7a-150. Vinyl Polymers in Surface Face Coatings. C. W. Patton. *Official Digest*, March 1948, p. 267-279.

Properties, compositions, and application to metal and other surfaces. Formulations and application techniques.

7a-151. Metal Surfaces—Their Preparation and Painting. G. Diehlman, A. J. Eickhoff, and J. G. Wills. *Official Digest*, May 1948, p. 357-367.

The various methods used for iron and steel, zinc (galvanized iron), and aluminum and its alloys, 13 ref.

7a-152. Industrial Finishes and Finishing. F. G. Weed and N. P. Beckwith. *Official Digest*, May 1948, p. 383-399.

Materials and methods used in the protective and decorative coating of common industrial products.

7a-153. Organic Finishes for Metal Products. (Continued.) *Steel*, v. 122, June 28, 1948, p. 81-84, 100, 103; July 12, 1948, p. 97-98, 100, 102, 104.

In June 28th installment—Selection and classification of organic finishing materials; primer coatings and their application; resin baking castings by induction heating. In July 12 installment—properties and applicabilities of amine-formaldehyde resin coatings; melamine, silicone, and alkyd resins; cellulose-base coatings; high-solids metal lacquers; and other cellulose finishing materials. (To be continued.)

7a-154. Surface Finishing Automobile Moldings. L. F. Strong. *Metal Finishing*, v. 46, July 1948, p. 60-61.

Polishing and buffing of garnish, reveal, and outer-panel moldings.

7a-155. Wheel Speeds for Polishing and Buffing. *Metal Finishing*, v. 46, July 1948, p. 75.

Recommended surface speeds for polishing and buffing various metals.

7a-156. Stripping Electrodeposits; Immersion and Electrolytic Type Processes. N. D. Hoffman. *Metal Industry*, v. 73, July 2, 1948, p. 6-7. A condensation.

(Turn to page 22)

bers to insure that distinguished work in all branches of the engineering alloy steel field (exclusive of toolsteels, stainless and other high-alloy steels) will be recognized. Nominations for recipients of these awards should be sent to Chairman Schlendorf.

75 Years of Alloy Steel Progress

The president of your society feels a personal interest in the plans to visualize "75 Years of Alloy Steel Progress", because the first alloy steel used anywhere in the world for an engineering structure was made in the plant of Wm. Butcher Steel Works (predecessor of Midvale Co.) I refer to the chromium steel compression members placed in the main arches of the historic Eads Bridge over the Mississippi at St. Louis.

It is appropriate, therefore, that the coming Philadelphia convention of the American Society for Metals should visualize the 75 years' progress of an idea and an industry born here so long ago. A special committee, under the chairmanship of Robert

A. Wheeler, is charged with the responsibility for collecting exhibits that will do this clearly and dramatically—not only the steelmaking processes but also the machines and other applications that mark the milestones of this journey. The personnel of the committee is shown below.

Technical Program

For 30 years, the American Society for Metals has published technical papers about alloy steel. No other subject has been discussed so amply in the A.S.M. *Transactions*. At the 1948 Metal Congress, this record of American progress in alloy steel will be carried forward again, with 19 convention papers reporting latest developments in the science and technology of alloy steel. In addition to the regular technical sessions, a special report will be presented dealing with the history of alloy steel in America.

Metallographic Exhibit

Another matter deserving advance attention from members of the

American Society for Metals is the metallographic exhibit to be held in Convention Hall along with the 30th National Metal Congress and Exposition. This will be the third such exhibit. The rules are few and simple. They are printed on page 2.

Advance Registration

The 350 exhibitors in the Metal Exposition all like to get detailed information, both during and after the event, about the character of the attendance. Such information can be secured only from properly completed registration cards. In the past many people have been irked by delays at the resigistration desk, no matter how many clerks were present to handle anticipated peaks in attendance.

Such delays should be avoided by a scheme of advance registration. On page 63 of this issue of *Metals Review* you will find a registration form. When this form is properly completed and mailed, an entrance badge will be returned to you which will enable you to walk right through the gate!

Committees for "A Salute to Alloy Steels"

Honorary Committee

Chairman: Francis B. Foley, president, American Society for Metals.
 William R. Boyd, Jr., president, American Petroleum Institute.
 Oliver P. Echols, president, Aircraft Industries Association of America, Inc.
 B. F. Fairless, president, U. S. Steel Corp.
 William T. Faricy, president, Association of American Railroads.
 A. B. Homer, president, Bethlehem Steel Co.
 William C. Johnson, president, National Electrical Manufacturers Association.
 George W. Mason, president, Automobile Manufacturers Association.
 J. H. Oppenheim, president, Farm Equipment Institute.
 A. G. Bryant, president, National Machine Tool Builders Association.
 Walter S. Tower, president, American National Electrical Manufacturers Association.
 C. M. White, president, Republic Steel Corp.
 Harold K. Work, vice-president, American Society for Metals.

Distinguished Service Awards Committee

Chairman: J. M. Schlendorf, vice-president in charge of sales, Republic Steel Corp.
Vice-Chairman: Rufus E. Zimmerman, vice-president, U. S. Steel Corp.
 Robert S. Archer, vice-president, Climax Molybdenum Co.
 John Chipman, professor of metallurgy, Massachusetts Institute of Technology.
 H. J. French, vice-president, International Nickel Co.



R. A. Wheeler F. B. Foley J. M. Schlendorf

F. P. Gilligan, secretary-treasurer, Henry Southern Engineering Co.
 W. E. Jominy, staff engineer, Chrysler Corp.
 T. W. Lippert, editor, *Iron Age*.
 I. C. Mackie, director of metallurgy and research, Dominion Steel & Coal Corp., Ltd.
 Harry W. McQuaid, consulting metallurgist.
 Fred P. Peters, editor, *Materials & Methods*.
 Walter E. Remmers, president, Electro Metallurgical Corp.
 E. S. Rowland, research metallurgist, Timken Roller Bearing Co.
 Earl L. Shaner, editor, *Steel*.
 A. E. White, director, engineering research institute, University of Michigan.
 Clyde E. Williams, director, Battelle Memorial Institute.

Committee To Visualize 75 Years of Alloy Steel Progress

Chairman: Robert A. Wheeler, manager of publicity, International Nickel Co.
Aircraft Industry: J. B. Johnson, chief of materials lab, Wright Field
Automobile Industry: A. L. Boegehold, head of metallurgical dept., General Motors Corp., Research Laboratory.
Electrical Industry: W. E. Ruder, research metallurgist, General Electric Co.
Farm Equipment: Harry B. Knowlton, supervisor of materials engineering, International Harvester Co.
Machine Tools: Richard F. Harvey, metallurgist, Brown & Sharpe Manufacturing Co.
Petroleum Industry: Robert W. Schlumpf, chief metallurgist, Hughes Tool Co.
Railroads: Ray McBrien, engineer, research & standards, Denver & Rio Grande Western R.R.
Steel Industry: M. A. Grossmann, director of research, Carnegie-Illinois Steel Corp.
 C. H. Herty, Jr., assistant to vice-president, Bethlehem Steel Co.
 E. C. Smith, chief metallurgist, Republic Steel Corp.
Display Consultants: R. B. Hanna, display dept., General Electric Co.
 H. H. Harris, president, General Alloys Co.
 D. C. Miner, advertising manager, E. F. Houghton & Co.
 C. M. Parker, secretary, committee on manufacturing problems, American Iron & Steel Institute

Previously abstracted from *Plating*, v. 35, April 1948, p. 351-352, 404. See item 7a-90, 1948.

7a-157. Shielding Fan Systems From Corrosion. Walter E. Langlois. *Heating and Ventilating*, v. 45, July 1948, p. 70-72.

Protective coatings to safeguard fan systems from corrosive and abrasive action of the fumes and air moved. Tables show specific coatings that will resist the action of acids and salts. Emphasizes paints, resins, and rubbers.

7a-158. Finishing Small Parts on a Production Basis. Rollin H. Wampler. *Products Finishing*, v. 12, July 1948, p. 50, 52, 54, 56.

Methods used at a number of plants.

7a-159. Finishing Clinic. Allen G. Gray. *Products Finishing*, v. 12, July 1948, p. 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92.

Accelerated exposure testing of organic coatings; importance of proper control in anodizing aluminum alloys; preparation of base metal for gold plating; nonmetallic coatings for the protection of steel.

7a-160. Practical Applications of Modern Products. *Products Finishing*, v. 12, July 1948, p. 94-96, 98, 100, 102.

Modern finishing techniques boost production of Tracy "Customized" kitchens; refrigerators painted electrostatically at Norge; improved process control and increased production obtained with radiant heat.

7a-161. Recent Developments in Synthetic Resins for Protective Coatings. L. R. Whiting. *Paint, Oil & Chemical Review*, v. 111, July 8, 1948, p. 27-28, 30-32.

Use of the above on metals.

7a-162. How to Recover the Loss in the 50% Enamel Overspray. *Ceramic Industry*, v. 51, July 1948, p. 61, 64.

Based on paper by Donald W. Scott, L. A. Roe, and B. J. Sweo. *Mining Technology*, v. 11, Sept. 1947. See item 7-405, 1947.

7a-163. Engraving on Metal Plates by Means of Explosives. J. H. Cook. *Research*, v. 1, July 1948, p. 474-477.

A composite explosive charge uses explosives with different detonation velocities to insure that the detonation wave is plane and normal to the metal surface. In this way large and elegant designs can be produced.

7a-164. Die elektrochemische Untersuchung der durch basisch Überzüge geschützten Metalle. (Electrochemical Study of Metals Protected by Basic Coatings). V. Cupr. *Archiv für Metallkunde*, v. 1, June 1947, p. 264-267.

A theoretical discussion which indicates the possibility of investigating phosphate and other basic coatings by electrochemical methods.

7b—Ferrous

7b-113. Über den Anfall von Hartzink bei der Feuerverzinkung. I. Einfluss des Reinheitsgrades bzw. der Legierungsbestandteile des Eisens und Zinks und der Vorbehandlung der Ware. II. Einfluss der Eintauchdauer, der Temperatur- und der Hartzinkaufnahme. III. Der Einfluss der Bauart und Beheizung der Verzinkungspfannen auf die Hartzinkbildung. (Formation of Brittle Iron-Zinc Alloy Layers During Galvanizing. Part I. Influence of Purity and Alloy Constituents of the Iron and Zinc and of Pretreatment of the Parts. Part II. Influence of Immersion Time, Temperature, and Growth of the Iron-Zinc Alloy Layer. Part III. The Effect of the Construction and Heating Method of the Galvanizing Tanks on Formation of the Iron-Zinc Alloy Layer.) Edmund R.

Thews. *Metaloberfläche*, v. 1, Feb. 1947, p. 39-42; March 1947, p. 61-63; April 1947, p. 84-86.

Twenty-six factors have been identified which may affect the formation of brittle Fe-Zn alloy layers during galvanizing. Supporting experimental evidence.

7b-114. Korrosionsschutz durch Inkromierung. (Corrosion Protection by Chromium-Diffusion Coatings.) Fritz Steinberg. *Metaloberfläche*, v. 1, March 1947, p. 58-60.

Chromium diffusion coatings are formed on steel at 1000° C. by sealing parts to be coated inside a retort containing chromium chloride. The surface layer may have an alloy content as high as 35% Cr. Applications, methods of fabrication and welding, and corrosion data.

7b-115. Verfahren zur Entplattierung von Kupfer- und messingplattiertem Eisenschrott. (Stripping of the Electroplate From Copper and Brass-Plated Scrap Iron.) Carl Schaarwächter. *Metaloberfläche*, v. 1, April 1947, p. 89-90.

Three processes were studied for the recovery of copper from plated scrap: oxidation at 960° C. in a muffle furnace; chemical removal by an ammoniacal solution; and electrocuring with an acid or cyanide bath. The latter method gave the best results.

7b-116. Continuous Strip Pickling. Edwin D. Martin. *American Iron and Steel Institute, Preprint*, 1948, 53 pages.

Developments and problems involved in chemical removal of oxide scale, formed during hot rolling, from mild, plain-carbon steel; equipment and procedure for pickling; disposal of waste pickle liquor.

7b-117. An Accelerated Test for Evaluating the Protective Power of Finishes Against Sulfur Dioxide. Alfred J. Arker and Wayne R. Frisch. *Organic Finishing*, v. 9, May 1948, p. 9-19.

Test apparatus in which the finish is subjected to an atmosphere of warm, moist SO₂ and the average weight gained per unit area exposed determined for various times of exposure. Empirical equations are developed to correlate data from equipment of different sizes and to obtain comparative values of "protective power".

7b-118. Huge Steel Casting Successfully Cleaned Electrolytically in Molten Caustic Bath. *Industrial Heating*, v. 15, June 1948, p. 1018. Based on paper by John A. Wettergreen.

Previously abstracted from *American Foundryman*, v. 13, April 1948, p. 120-124. See item 7b-81, 1948.

7b-119. Spray Pickling of Enamel Ware. *Industrial Heating*, v. 15, June 1948, p. 1020, 1022. Based on paper by George N. Tuttle.

Previously abstracted from *Enamelist*, v. 24, Oct. 1947, p. 4-7, 58-59. See item 7-422, R.M.L., v. 4, 1947.

7b-120. 1300° F. Porcelain Enamels—A New Era in Product Finishing. Albert B. Friedman. *Better Enameling*, v. 19, June 1948, p. 5, 19.

New development and necessary changes in enameling techniques.

7b-121. Trouble Shootin'. *Better Enameling*, v. 19, June 1948, p. 12-14.

Defects in porcelain enamel and their remedies: defective steel surface; burned carbon area; burrs; etched or pitted condition; onion skin or deoxidized scale; and inclusions.

7b-122. Recommendations for an Enamel Plant Control System. Part III. (Concluded). John L. McLaughlin. *Better Enameling*, v. 19, June 1948, p. 16-17, 36.

7b-123. Finishing Metal Caskets on Conveyor Lines. Robert Zureick. *Industrial Finishing*, v. 24, June 1948, p. 28-30, 33-34, 38, 40.

Mass production methods and modern equipment are used for preparing the surfaces of steel caskets and hardware for spraying, and for drying all protective and decorative coatings.

7b-124. Evaluating Hydrogen Embrittlement in Acid Pickling. M. Rosenfeld. *Iron Age*, v. 161, June 17, 1948, p. 82-87.

By means of the standard tensile test, embrittlement effects by hydrochloric and sulphuric acids were evaluated. The value of immersion in boiling water after pickling and the use of various reagents in the pickling acids. 11 ref.

7b-125. Corrosion Inhibiting Primers for Ferrous Metals. W. G. Huckle and H. S. Davidson. *American Paint Journal*, v. 32, June 28, 1948, p. 76-77, 80, 82, 84-85, 88, 90-96, 98.

Experimental work designed primarily to determine what pigment or pigments give most satisfactory results when used with zinc chromate. Relative effectiveness of various types of pigments; various types of binders; determination of amount of zinc yellow required for effective metal protection; and comparison of several primers applied to sandblasted, rusted, or mill-scaled steel surfaces.

7b-126. Pneumatic Hand-Chipping. P. S. Paluch. *Iron and Steel Engineer*, v. 25, June 1948, p. 86-87; discussion, p. 95-97.

Recommended procedures for removing surface defects from semi-finished steel.

7b-127. Application of Hand Scarfing to Modern Surface Conditioning. P. S. Paluch. *Iron and Steel Engineer*, v. 25, June 1948, p. 87-91; discussion, p. 95-97.

7b-128. Billet Conditioning With Mechanical Chippers. J. H. Vollmer. *Iron and Steel Engineer*, v. 25, June 1948, p. 91-95; discussion, p. 95-97.

7b-129. Abrasive Blasting Speeds Pipe Cleaning. *Iron Age*, v. 162, July 1, 1948, p. 79.

7b-130. Electrostatic Spray Lowers Labor and Upkeep Costs. G. P. Kennedy. *Factory Management and Maintenance*, v. 106, July 1948, p. 98-99.

Entire painting operation on refrigerator cabinets and doors is accomplished in a single conveyorized pass through a single spray booth.

7b-131. Interpretation of Data Relating to Coefficient of Expansion of Various Types of Porcelain Enamels. Part I. R. L. Fellows and O. R. Novy. *Better Enameling*, v. 19, June 1948, p. 6-11, 35.

Use of the data in the selection of porcelain enamels. (To be continued.)

7b-132. Vitreous Enameling of Chemical Plant. James D. Currie. *Proceedings of the Institute of British Foundrymen*, v. 40, 1946-1947, p. B99-B109; discussion, p. B109.

Properties of vitreous linings for mild steel and cast-iron vessels with a highly acid resisting enamel.

7b-133. Porcelain Enamel Process Defects; Causes and Possible Cures. Part IV. Crazing, Tearing, Crawling. M. E. McHardy. *Ceramic Industry*, v. 51, July 1948, p. 52, 60. (To be continued.)

7b-134. How to Prevent Defects in Porcelain Enameling Holloware. Part IV. Spontaneous Failures. F. A. Petersen. *Ceramic Industry*, v. 51, July 1948, p. 59-60.

(Turn to page 24)



Tentative Technical Program and Preprint List

Monday, Oct. 25—9:30 A.M.

1. The Isothermal Decomposition of Martensite and Retained Austenite, by B. L. Averbach and Morris Cohen, Massachusetts Institute of Technology
2. The Dimensional Stability of Steel. Part IV—Tool Steels, by B. S. Lement, B. L. Averbach and Morris Cohen, Massachusetts Institute of Technology
3. The Transformation and Retention of Austenite in S.A.E. 5140, 2340 and T 1340 Steels of Comparable Hardenability, by A. R. Troiano, University of Notre Dame
4. The Microstructure of Low-Carbon Steel, by R. L. Rickett and F. C. Kristufek, United States Steel Corp.

Monday, Oct. 25—2:00 P.M.

5. Influence of Ni and Mo on Isothermal Transformation of Austenite in Pure Fe-Ni-Mo Alloys Containing 0.55 Carbon, by D. A. Scott, W. M. Armstrong and F. A. Forward, University of British Columbia
6. The Transformation Characteristics of Ten Selected Nickel Steels, by J. P. Sheehan, Armour Research Foundation, C. A. Julien, Naval Research Laboratory, and A. R. Troiano, University of Notre Dame
7. The Metallography and Heat Treatment of 8 to 10% Nickel Steel, by G. R. Brophy and A. J. Miller, International Nickel Co.
8. Predicting the Effect of Complex Tempering Cycles, by J. L. Waisman, Douglas Aircraft Co., and W. T. Snyder, Herff Jones Co.

Tuesday, Oct. 26—9:30 A.M.

Session No. 1

9. Distribution of Nonmetallic Inclusions in Some Killed Alloy Steel Ingots, by K. L. Fetter, Youngstown Sheet and Tube Co., M. M. Helzel and J. W. Spretnak, Carnegie Institute of Technology
10. Some Factors Affecting Subsurface Defects in Large Forging Steel Ingots, by E. A. Loria, Mellon Institute of Industrial Research, and H. D. Shephard, Kerchner, Marshall & Co.
11. Density Variations in Some Killed Steel Ingots, by C. F. Sawyer, Vanadium-Alloys Steel Co., and J. W. Spretnak, Carnegie Institute of Technology
12. The Nature of Inclusions in Tensile Fractures of Forging Steels, by H. D. Shephard, Kerchner, Marshall & Co., and E. A. Loria, Mellon Institute of Industrial Research

Session No. 2

13. Fractographic Examination of Tungsten, by C. A. Zapffe and F. K. Landgraf, Baltimore
14. The Effect of Orientation on Knoop Hardness of Single Crystals of Zinc and Silicon Ferrite, by F. W. Daniels and C. G. Dunn, General Electric Co.
15. The Effect of Single Addition Metals on the Recrystallization, Electrical Conductivity and Rupture Strength of Pure Aluminum, by R. H. Harrington, General Electric Co.
16. Forming and Heat Treatment of Corrugated Diaphragms, by R. I. Jaffee, E. I. Beidler and R. H. Ramsey, Battelle Memorial Institute

All of the papers presented at the Annual Convention of the American Society for Metals in Philadelphia, Oct. 25 through 29, will be preprinted for distribution to members of the A.S.M. The society will print only 10% in excess of the number of orders for preprints in the office on press date and this excess 10% will be sent out as long as it lasts. Order by number from this list before Sept. 1, 1948.

Tuesday, Oct. 26—2:00 P.M.

17. The Microstructure and Mechanical Properties of Cast Steels, by M. F. Hawkes and B. F. Brown, Carnegie Institute of Technology
18. Effect of Vanadium on the Properties of Cast Carbon and Carbon-Molybdenum Steels, by N. A. Ziegler, W. L. Meinhardt and J. R. Goldsmith, Crane Co.
19. Mechanical Properties, Including Fatigue, of Aircraft Alloys at Very Low Temperatures, by J. L. Zambrow and M. G. Fontana, Ohio State University
20. Influence of Low Temperature on the Mechanical Properties of 18-8 Chromium-Nickel Steel, by D. J. McAdam, Jr., G. W. Geil and Frances Jane Cromwell, National Bureau of Standards

Wednesday, Oct. 27—10:00 A.M.

A.S.M. Annual Meeting

Edward de Mille Campbell Memorial Lecture, by Morris Cohen, Massachusetts Institute of Technology

Wednesday, Oct. 27—2:00 P.M.

21. Basic Reasons for Good Machinability of "Free Machining" Steels, by M. Eugene Merchant and N. Zlatin, Cincinnati Milling Machine Co.
22. An End Quenched Bar for Deep Hardening Steels, by Gerrit DeVries, U. S. Naval Proving Ground
23. Transverse Mechanical Properties in Heat Treated Wrought Steel Products, by Cyril Wells and R. F. Mehl, Carnegie Institute of Technology
24. Residual Stresses and Microstructure in Hollow Cylinders, by H. B. Wishart and R. K. Potter, Carnegie-Illinois Steel Corp.

Thursday, Oct. 28—9:30 A.M.

Session No. 1

25. Resistance to Sensitization of Austenitic Chromium-Nickel Steels of 0.03 Max. Carbon Content, by W. O. Binder and C. M. Brown, Union Carbide and Carbon Research Laboratories, and Russell Franks, Electro Metallurgical Co.

26. Mechanism of the Rapid Oxidation of High-Temperature, High-Strength Alloys Containing Molybdenum, by W. C. Leslie and M. G. Fontana, Ohio State University

27. Stabilization of Austenitic Stainless Steel, by Samuel J. Rosenberg and John H. Darr, National Bureau of Standards

28. Delta Ferrite Formation and Its Influence on the Formation of Sigma Phase in a Wrought Heat Resisting Steel, by John J. Gilman, Illinois Institute of Technology, Pun Kien Koh, Allegheny Ludlum Steel Corp., and Otto Zmeskal, Illinois Institute of Technology

Session No. 2

29. The Indium-Bismuth Phase Diagram, by E. A. Peretti and S. C. Carapella, Jr., University of Notre Dame

30. Manganese-Zinc Phase Diagram from 0 to 50% Zinc, by E. V. Potter, U. S. Navy Electronics Laboratory, and R. W. Huber, Bureau of Mines

31. Dilatometric Effects of Hardening and Recrystallization in the 60 Copper, 20 Nickel, 20 Manganese Alloy, by C. H. Samans, C. C. Brayton, H. L. Drake and L. Litchfield, American Optical Co.

32. Beta Laminations in Cartridge Brass, by Ralph L. Dowdell, University of Minnesota, Charles A. Nagler, Wayne University, Morris E. Fine, Bell Telephone Laboratories, Harold P. Klug, Mellon Institute of Industrial Research, and Gust Bitsianes, University of Minnesota

Thursday, Oct. 28—2:00 P.M.

33. Aging in Gas Turbine Type Alloys, by Nicholas J. Grant and J. R. Lane, Massachusetts Institute of Technology

34. Nickel-Base Alloys for High-Temperature Applications, by A. G. Guy, North Carolina State College

35. Short-Time High-Temperature Deformation Characteristics of Several Sheet Alloys, by James Miller and Glen Guarnieri, Cornell Aeronautical Laboratory

36. Stability of Steels at Elevated Temperatures, by A. B. Wilder and J. O. Light, National Tube Co.

Friday, Oct. 29—9:30 A.M.

37. Application of the Theory of Diffusion to the Formation of Alloys in Powder Metallurgy, by Pol Duwez and Charles B. Jordan, California Institute of Technology

38. Thermodynamics in the Decarburization of Steel with Mill Scale, by W. A. Pennington, Carrier Corp.

39. Cause and Cure of Inverse Chill and Hard Spots in Cast Iron, by C. A. Zapffe and R. L. Phebus, Baltimore

40. Some Wetting Properties of Metal Powders, by Bernard Kopelman and C. C. Gregg, Sylvania Electric Products, Inc.

Friday, Oct. 29—2:00 P.M.

41. A Versatile Vacuum-Fusion Apparatus, by Manley W. Mallett, Battelle Memorial Institute

42. The Abrasion Resistance of Metals, by R. D. Haworth, Jr., Armour Research Foundation

43. Solder Flow Tester for Tin Plate, by J. J. Sperotto, American Can Co.

44. Nature and Detection of Grinding Burn in Steel, by L. P. Tarasov and C. O. Lundberg, Norton Co.

7c—Nonferrous

7c-21. The Deposition of Tantalum and Columbium from Their Volatilized Halides. C. F. Powell, I. E. Campbell, and B. W. Gonser. *Journal of the Electrochemical Society*, v. 93, June 1948, p. 258-265.

General conditions for obtaining adherent, ductile, nonporous coatings of Ta and Cb by hydrogen reduction of their pentachlorides. Some of the chemical and physical properties and micrographic and X-ray diffraction studies of a few deposits. 12 ref.

7c-22. Pickling Monel Metal. Edward Rosen and George Black. *Materials & Methods*, v. 27, June 1948, p. 105.

7c-23. Grinding, Polishing and Buffing of Monel. Edward Rosen. *Materials & Methods*, v. 27, June 1948, p. 107.

7c-24. Stripping Rhodium Plate; Methods of Removal from Nickel-Plated Brass or Copper. M. Shapiro. *Metal Industry*, v. 72, June 4, 1948, p. 462, 466. Condensed from a recent issue of *Metal Finishing*.

Two successful methods are described.

7c-25. Chemical Colouring; A Decorative Finishing Treatment for Zinc-Base Alloys. W. C. Coppins. *Metal Industry*, v. 72, June 11, 1948, p. 482.

Process developed using a molybdate solution, which results in a mottled surface showing interference colors. Similar effect can be obtained on Al alloys.

7c-26. Acidic Emulsion Cleaner for Zinc Base Diecastings. *Iron Age*, v. 161, June 17, 1948, p. 79.

Has brought cost savings and the virtual elimination of rejects due to blistering, on baking, of the plate from the base metal in electroplating.

7c-27. Die Castings Must Be Clean. I. A Compendium of Cleaning Cycles Proved in Present-Day Production Practice. Arthur P. Schulze. *Products Finishing*, v. 12, July 1948, p. 26-28, 30, 32, 34, 36, 38, 40, 42, 44, 46. 18 references.

7c-28. Paint Baking of Die Castings by Infra-Red. *Die Castings*, v. 6, July 1948, p. 63-64.

Use by Syncro Saw Corp., Rochester, Mich.

7c-29. The Adhesion of Enamel Finishes to Electro-Plated Cadmium Coatings. E. E. Halls. *Metallurgia*, v. 38, June 1948, p. 75-78.

Extensive laboratory tests were conducted on cadmium-plated steel panels having various types of enamel finish and on which the cadmium was given various chemical treatments prior to enameling.

7c-30. A Study of Ceramic Coatings for High-Temperature Protection of Molybdenum. D. G. Moore, L. H. Bolz, and W. N. Harrison. *National Advisory Committee for Aeronautics, Technical Note No. 1626*, July 1948, 31 pages.

Specimens of molybdenum are covered with a protective ceramic coating and then given tests which include heating at constant temperature in an air atmosphere, heating in a gas-oxygen flame, thermal-shock tests, and service testing in the blast of ram-jet engines. Oxidation of molybdenum is greatly retarded by the best of the coatings. Short-time (10 to 45 min.) protection of molybdenum in oxidizing atmospheres at gas temperatures up to 3500° F. is possible.

7c-31. Korrosion phosphatierter Fein-zinklegierungen durch Feuerlöschmittel. (Corrosion of Phosphated High-Grade Zinc Alloys by Fire-Ex-

tinguishing Liquids). R. Beythien. *Archiv für Metallkunde*, v. 1, June 1947, p. 286-288.

Experiments for nine commonly used fire-extinguishing solutions or liquids, show that, in general, phosphating (bonderizing) gives less effective protection than chromizing. Some bonderized samples were found to be less corrosion resistant than unprotected samples. Use of lacquer coatings is suggested.

7d—Light Metals

7d-31. Non-Blister Bake Finish on Aluminum Castings. A. P. Lehmann. *Industrial Finishing*, v. 24, June 1948, p. 51-52, 54.

The cause and effect of blistering of baked-on finishes; and an efficient, economical and practical method of eliminating blisters without special pretreatment, other than degreasing if necessary.

7d-32. Tin Coating Aluminium; Surface Preparation for Electroplating, Painting or Plastic Bonding. *Electroplating*, v. 1, June 1948, p. 408-409.

A patented process for producing a firmly-adherent tin coating on aluminum by chemical means which protects the metal during storage and affords a highly satisfactory surface on which to electrodeposit other metals or to apply paints, enamels, rubber, plastics, and cements.

7d-33. Aluminum Mirrors the Stars. *Aluminum Bulletin*, v. 1, June, 1948, p. 1.

Vacuum deposition of Al on the surface of the disk of the new 200-in. Mt. Palomar telescope in California.

7d-34. Painting Aluminum Structures. Robert I. Wray and Junius D. Edwards. *Official Digest*, April 1948, p. 315-325.

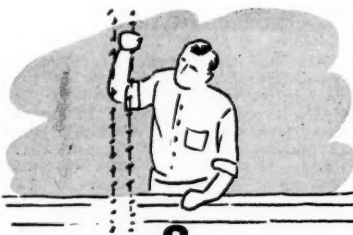
Previously abstracted from *Paint, Oil and Chemical Review*, v. 111, April 15, 1948, p. 16, 46, 48, 50, 53-54. See item 7d-17, 1948.

7d-35. Process Sheet for Zinc-Immersion Treatment. George Black. *American Machinist*, v. 92, July 15, 1948, p. 135.

The zinc-immersion process is a method for applying an extremely thin coating of zinc on the surface of aluminum and its alloys, to facilitate subsequent electroplating.

For additional annotations indexed in other sections, see:

6b-81; 6c-21; 8-166; 11-183-192; 15a-10; 19b-92; 20a-273-293; 27d-10.



8

ELECTRODEPOSITION and ELECTROFINISHING

8-141. Erfahrungen mit elektrolytisch hergestellten Laufschichten in Gleitlagern unter besonderer Berücksichtigung des Auslaufes. (Experiences With Electrolytically Prepared Work-

ing Surfaces for Slide Bearings With Special Attention to Foreign Work.) Franz Bollenrath. *Metalloberfläche*, v. 1, Jan. 1947, p. 3-10. 36 ref.

8-142. Über die Lebensdauer kiesel-fluorwasserstoffsäurehaltiger Chrombäder. (Life of Fluosilicic-Acid-Containing Chromium-Plating Baths.) Karl Gebauer and Karl Sommer. *Metalloberfläche*, v. 1, Feb. 1947, p. 25-27.

Chromium plating baths containing fluosilicic acid are economical and have long life. The effect of variation in bath compositions during the useful life.

8-143. Die elektrolytische Abscheidung glänzender Metallniederschläge. I. Allgemeines und wissenschaftliche Grundlagen. II. Die Praxis der Glanzbäder. (The Electrolytic Deposition of Bright Metal Deposits. Part I. General and Scientific Principles. Part II. Bright Metal Baths in Practice.) Johannes Fischer. *Metalloberfläche*, v. 1, Feb. 1947, p. 28-31; March 1947, p. 49-56.

A comprehensive literature review including considerable German work. Many bath compositions.

8-144. Elektrophosphatierung. (Electrolytic Phosphating.) Richard Springer. *Metalloberfläche*, v. 1, April 1947, p. 78-80.

Cathodic phosphating and phosphating with alternating current.

8-145. Elektrolytisches Polieren. (Electrolytic Polishing.) Johannes Fischer. *Metalloberfläche*, v. 1, April 1947, p. 81-83.

Published bath compositions for the different metals.

8-146. Oberflächenschutz von Stahl durch Kupferplattierung. (Surface Protection of Steel by Copper Plating.) H. Bröking. *Metalloberfläche*, v. 1, May 1947, p. 101-104.

Various methods for coating steel with copper and its alloys. Strength at several temperatures and heat conductivity.

8-147. Rauhe und streifige Niederschläge bei der Kupfergalvanoplastik. (Rough and Striated Deposits in Copper Plating.) Richard Erdmann. *Metalloberfläche*, v. 1, May 1947, p. 114.

Recommended procedures for avoidance of rough and striated deposits.

8-148. Procédé d'étude du polissage électrolytique. (Method for Study of Electroplishing.) Israel Epelboim and Claude Chalin. *Comptes Rendus (France)*, v. 226, Jan. 26, 1948, p. 324-326.

Previously abstracted from *Metals & Corrosion*, v. 23, Jan. 1948, p. 1-4. See item 8-127, 1948.

8-149. Electroplated Coatings. George Black. *Materials & Methods*, v. 27, June 1948, p. 93-104.

Properties of coatings; types and characteristics of electrolytes; electroplating theory; preparation and equipment for electroplating; and testing of coatings.

8-150. Electrolytic Descaling. Carl A. Zapffe. *Metal Progress*, v. 53, June 1948, p. 833-836.

Further evidence for the theory that scale is blasted away from metal by bubbles of hydrogen issuing from within the metal and under high pressure.

8-151. Nature of Hexagonal Chromium and Structure of Electrolytic Chromium Deposits. (In Russian.) S. A. Nemnov. *Zhurnal Tekhnicheskoi Fiziki (Journal of Technical Physics)*, v. 18, Feb. 1948, p. 239-246.

Critical study of the literature indicates that hexagonal Cr should be considered as a metastable phase. During electrodeposition, with a

(Turn to page 26)



COMPLIMENTS

To J. L. MAUTHE, vice-president, and KARL L. FETTERS, special metallurgist, Youngstown Sheet and Tube Co. on the award of the American Iron and Steel Institute Medal for their paper on "The Mineralogy of Basic Openhearth Slags" read before the Institute in 1947.

To EARLE C. SMITH, chief metallurgist of Republic Steel Corp., Cleveland, on the award of the Lamme Medal of Ohio State University for meritorious achievement in engineering. Dr. Smith was graduated from Ohio State with the degree of Engineer of Mines in 1888, and was granted the honorary degree of Doctor of Science by Case Institute of Technology in 1947. Nationally known for his many contributions to steelmaking practices, he was recipient of the Gold Medal of the A.S.M. in 1946.

To RICHARD L. TEMPLIN, assistant director of research and chief engineer of tests for Aluminum Co. of America, on his nomination as president of the American Society for Testing Materials.



E. C. Smith

To MARVIN J. UDY, consulting engineer and originator of the process for cadmium plating which formed the basis for the formation of the Udylite Corp. of Detroit, on the award of the Jacob F. Schoellkopf Medal for 1948 of the Western New York Section of the American Chemical Society.

To T. B. JEFFERSON, editor of *Welding Engineer*, and for the past eight years secretary-treasurer of the Chicago Section, American Welding Society, on his nomination as a director of the American Welding Society.

To WALTER E. REMMERS, president of the Electro Metallurgical Co., New York, on the award of the degree of Doctor of Engineering (honoris causa) by the School of Mines and Metallurgy of the University of Missouri.

To the AKRON CHAPTER A.S.M. and to JACK W. HOBBS, publicity chairman, on the unique and amusing announcement of the chapter's summer outing.

To GEORGE W. PRESSELL, executive vice-president of E. F. Houghton & Co., Philadelphia, on his celebration in June of 45 years with that organization.

To WENDELL F. HESS, head of metallurgical engineering at Rensselaer

Polytechnic Institute, on his election as an honorary member of the American Welding Society.

To GEORGE W. MOTHERWELL, works manager of Wyman-Gordon Co., Worcester, Mass., on his election as president of the Magnesium Association.

To HENRY H. HAUSNER and WALTER E. KINGSTON of the metallurgical research laboratories of Sylvania Electric Products, Inc., on the presentation of two scientific papers on powder metallurgy before the First International Metal Powders Conference in Graz, Austria, July 12 through 17.

"Dad" Metzger Dies at 90; Was With Disston 77 years

George C. Metzger, a blacksmith for 75 years and a venerable authority on metals, died last month at the age of 90. He was a long-time member of the Philadelphia Chapter A.S.M., where he was affectionately known as "Dad" Metzger.

Mr. Metzger was head of the blacksmith shop of Henry Disston & Sons, Philadelphia saw manufacturers, when he retired Dec. 31, 1946, after 77 years' employment by the same concern. He already had worked for Henry Disston, founder of the company, for about two years before becoming an apprentice blacksmith at 13. Since then he helped produce arms for three wars, and saw the firm become one of the world's largest saw-making concerns.

The Reviewing Stand

EVER SINCE the matter of punch card filing of metallurgical literature was first mentioned in this column last January, we have not been allowed to forget about it.

From the letters and comments received, it would appear that a number of research workers and metallurgists are working independently to devise punch card systems suited to their individual needs—either for a broad classification of metallurgical literature, or for a specialized branch of the field. The suggestion has been made that some central clearing house, where those who are interested in these problems could find out what others are doing along similar lines, would be a good thing, and further that the American Society for Metals would be a logical organization to serve as such a clearing house.

So A.S.M., being ever loath to shirk a metallurgical duty, is starting the ball to rolling.

The first essential is to get the literature classifiers and filers together for a personal exchange of ideas and experiences. A discussion group meeting has therefore been scheduled to take place during the National Metal Congress and Exposition at Philadelphia on Tuesday afternoon, Oct. 26. A cordial invitation is extended to all who are interested in

the subject to attend this organizational meeting.

So plan to come to the meeting and bring along an outline of work that you have been doing along this line—or, better yet, submit it in advance of the meeting. A small library of articles and information has already been gathered (not all particularly pertinent to metallurgy, however), and additions from those who expect to attend the meeting would form a good starting point for the discussion.

Also, extend the invitation to your plant librarian. While most of the inquiries and comments, of course, have come from metallurgists and research workers, another prominent segment of the group will undoubtedly be composed of the technical and metallurgical librarians, whose experience in classification and indexing will be an essential supplement to the technical background of the metallurgist. Invitations are therefore now extended to all librarians in the metal industries to sit in on the meeting or take part in the discussion.

The meeting will be held in Convention Hall in Philadelphia on Tuesday afternoon, Oct. 26. Details as to time and meeting-room will be included in the Metal Congress program to be published in the September issue of *Metals Review*. M.R.H.

high degree of dispersion of the newly formed crystal, hexagonal Cr has the lowest amount of free energy. 26 ref.

8-152. The Value of Specifications for Nickel Electroplate. *Nickel Bulletin*, v. 21, April 1948, p. 46-48.

With reference to British Standard 1224:1945, which states that articles to be finished with chromium must first be plated with nickel.

8-153. Pore Volume of Electrolytically Produced Protective Coatings on Aluminum. K. Huber. *Journal of Colloid Science*, v. 3, June 1948, p. 197-206.

Protective oxide coatings produced electrolytically on aluminum have a structure closely similar to that of an ideal "columnar mixture" of Wiener. Attempt is made to compute the pore volume, basing the computation on Wiener's theory.

8-154. Electroplating Non-Metallic Articles. William Edwards. *Western Metals*, v. 6, June, 1948, p. 36-38.

Techniques used by six firms in the Los Angeles area. Conditions for which the process is especially suitable.

8-155. Plating Magnesium; Practical Process Involving Zinc Immersion Coating. H. K. DeLong. *Metal Industry*, v. 72, June 18, 1948, p. 502-503. Condensed from recent issue of *Materials & Methods*.

Previously abstracted from *American Machinist*, v. 92, May 6, 1948, p. 98-100. See item 8-112, 1948.

8-156. Process Sheet for Zinc Electroplating. George Black. *American Machinist*, v. 92, July 1, 1948, p. 127.

8-157. New Methods of Electro-Forming and Depositing Nickel Make Possible Economic Production of Complicated Shapes and Application of Metal on Plastic Bases. *Steel*, v. 123, July 12, 1948, p. 106, 109.

Two developments being used in a number of different fields.

8-158. Electrolytic Tinning Process Speeded by Power Brush Application. *Steel*, v. 123, July 12, 1948, p. 122.

8-159. Electroplating Magnesium and Its Alloys. H. K. DeLong. *Metal Finishing*, v. 46, July 1948, p. 46-49, 100.

Previously abstracted from *American Machinist*, v. 92, May 6, 1948, p. 98-100. See item 8-112, 1948.

8-160. Throwing Power of Electroplating Solutions. A. Mankowich. *Metal Finishing*, v. 46, July 1948, p. 50-54.

The various definitions of throwing power that have been proposed. Advantages and limitations of the Haring and Blum concept and of throwing-power determination by the Haring cell, 25 ref.

8-161. Fluid Mechanics: Forgotten Factor in Electroplating. Part III. Joseph B. Kushner. *Metal Finishing*, v. 46, July 1948, p. 55-59, 72.

How viscosity affects dragout, concentrations, and electropolishing. (To be concluded.)

8-162. The Mechanism of Exfoliation of Electrodeposited Surfaces. A. T. Steer. *Metal Finishing*, v. 46, July 1948, p. 62-70. Reprinted from *Sheet Metal Industries*.

8-163. Hard Plating on Aluminum; Electrodeposition of Chromium on to Light Alloy Castings. *Automobile Engineer*, v. 33, June 1948, p. 236.

Process developed by British firm and technique for preventing the breaking away of the deposit at the part edges.

8-164. Full Automatic Cadmium Plating at Friden. J. DeLamar Harrell. *Products Finishing*, v. 12, July 1948, p. 20-22, 24.

A loading conveyor combined with use of a full automatic plating machine enables Friden Calculating Machine Co. to cadmium-plate 8000 small parts per hr.

8-165. Diesel Engine Wear Speeded by Surface Disintegration; Slowed by Porous Chrome Plating. *SAE Journal*, v. 56, July 1948, p. 40-43. Discussion, p. 43. Based on U. S. Naval Engineering Experiment Station Investigations on Cylinder Liner Wear, by Warren G. Payne and William F. Joachim. (To be published in full in *SAE Quarterly Transactions*.)

Surface disintegration is an important factor in diesel-engine wear; and porous chromium plating protects the surface from it and also from other wear-inducing factors. Metal is lost from the cylinder wall in the form of fine particles by two mechanisms. Data on wear reduction by chromium plating.

8-166. Recent Developments in Tin and Tin Alloy Coatings. John Ireland. *Journal of the India Society of Engineers*, v. 13, Jan. 1948, p. 8-13.

Reviews especially the work of the Tin Research Institute in England with emphasis on electrodeposited coatings.

8-167. Neuere Untersuchungen über den Korrosionsschutz von Duralumin durch Plattieren. (Recent Work on the Prevention of Corrosion of Duralumin by Plating.) H. J. Seemann. *Metall*, Sept. 1947, p. 8-15.

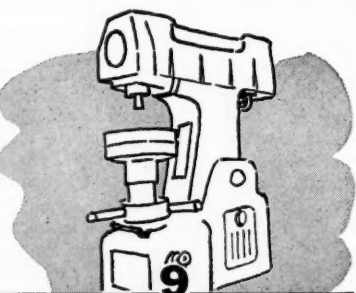
The corrosion resistance of duralumin plated with an Al-Mg-Si alloy; the effect of the plating on the strength and hardness of the core; the effect of copper diffusion in the cold and hot rolled metal; the effect of plating with pure aluminum.

8-168. Aluminiumplattierte Stahlbänder. (Aluminum-Plated Sheet Steel.) *Metall*, Nov. 1947, p. 83-84.

Three methods for depositing aluminum on steel: first, a special device to permit application of any thickness in one operation; second, use of special steel which can be annealed below the temperature of formation of brittle FeAl; and third, use of Si and Mn to prevent formation of FeAl. High corrosion resistance is obtained by plating pure Al on top of the primary deposit of Al alloy.

For additional annotations indexed in other sections, see:

3c-44; 7a-138-144-145-159; 27a-12.



PHYSICAL and MECHANICAL TESTING

9a—General

9a-42. Effect of Fatigue on Tension-Impact Resistance. William H. Hoppmann, II. *American Society for Testing Materials, Preprint No. 29*, 1948, 2 pages.

Possibility of using the high-velocity tension-impact test to determine the loss of impact resistance caused by fatigue in metals. Tension specimens from a low-carbon

steel plate in a known fatigue condition were subjected to impact tests at various velocities up to 120 ft. per sec. Energy and total elongation as functions of impact velocity.

9a-43. Hardness Testing of Soft Metals. T. H. Gray. *Iron Age*, v. 161, June 24, 1948, p. 82-87, 94.

Reasons why metals with hardness below 400 Diamond Pyramid Hardness present problems not ordinarily encountered in testing of heat treated steels. Various well-known and accepted types of apparatus for testing metals of low hardness, and influence of metallurgical characteristics on reliability of test results.

9a-44. Metallurgical Books. Sibyl E. Warren. *Metals Review*, v. 21, June 1948, p. 41, 43.

Fourth installment of bibliography of books published 1936-46. Sections on testing and mechanical properties and on corrosion and oxidation. (To be continued.)

9a-45. De betekenis van het heen-en-weerbuiggetal voor de beoordeling van plaatmetaal. (Use of the Bending Test as a Criterion of the Properties of Sheet Metal.) J. H. Palm. *Metalen*, v. 2, June 1948, p. 210-221.

Recommends use of alternate bending number as a criterion of the ductility of sheet metal. Advantages over the cupping test. (English abstract summarizes experimental results.)

9a-46. High Temperature Creep Testing. H. V. Kinsey. *Canadian Metals & Metallurgical Industries*, v. 11, June 1948, p. 19-22, 34.

Canadian laboratory facilities for measuring creep of metals at temperatures up to 2100° F.

9a-47. Testing Machinability. Robert Hutcheson. *Modern Machine Shop*, v. 21, July 1948, p. 180, 182, 184, 186, 188.

A new dynamometer type of machinability tester which will enable any average machine operator to conduct a rapid and accurate test on a sample of metal in the lathe. Instrument measures the vertical or tangential cutting force imposed on the tool, and this factor alone is a reliable measure of machinability.

9a-48. A Combined Creep Machine and X-Ray Spectrometer. H. J. Tapsell, H. V. Pollard, and W. A. Wood. *Journal of Scientific Instruments and Physics in Industry*, v. 25, June 1948, p. 198-199.

The machine is used in the study of the mechanical properties of metals in relation to X-ray structure, particularly their creep behavior at elevated temperatures. Special features permit X-ray examination at various times during creep under a stress which is kept constant throughout the period of uniform stretching, and while the specimen is oscillating about its axis and the X-ray film oscillating in its own plane.

9a-49. The Testing of Rotors for Fatigue Life. Jonathan Winson. *Journal of Aeronautical Sciences*, v. 15, July 1948, p. 392-402.

An experimental method for fatigue testing of articulated rotor blades consists in application of specified second harmonic control to a rotor revolving on a stationary whirl stand. Such a test can induce blade fatigue stresses approximating those met in flight.

9a-50. Non-Destructive Test Methods. Benson Carlin. *Product Engineering*, v. 19, July 1948, p. 129-132.

Seven basic methods.

(Turn to page 28)

Wyzalek Memorial Awards Presented to Students



Reported by R. A. Grange
U. S. Steel Research Laboratories

Students from six technical high schools conducted heat treating experiments and submitted papers describing and discussing their results to the Wyzalek Award Committee of the New Jersey Chapter this year. From each school, first and second prize winners were selected to receive the award at the May meeting of the chapter.

The John F. Wyzalek Memorial Awards of the New Jersey Chapter are given annually to perpetuate the memory of Mr. Wyzalek, a self-educated New Jersey metallurgist who achieved national prominence before his death in 1942. The work of the Wyzalek Award Committee has met with enthusiastic response from students, parents of students, and faculty members of the participating high schools, and has sponsored interest in heat treating and in metallurgy as a profession among high school students in northern New Jersey.

Ionic Theory of Slags And Deoxidation Expounded

Reported by F. R. Lorenz
Pennsylvania State College

The ionic theory of slags, slag-metal relationships, and the deoxidation of steel were some of the problems explained by John Chipman in an address before the Penn State Chapter A. S. M. on May 11. Dr. Chipman, head of the department of metallurgy at Massachusetts Institute of Technology, spoke on "The Metallurgy of Liquid Steel".

The bonding of the silicate ions, whether as independent tetrahedra or as long chain structures, was discussed and the subsequent influence on slag viscosity was shown. Dr. Chipman also suggested that oxides other than iron oxide are soluble in the molten metal and that the presence of chromium increases the total oxygen present in the metal.

William Klaile, Chairman of the New Jersey Chapter A.S.M., Presents the 1948 John F. Wyzalek Memorial Award Certificates and Cash Prizes to Winning Students From Six Technical High Schools in Northern New Jersey, While Members of the Award Committee Look on

Laboratory Work On Fatigue Life of Springs Described

Reported by H. L. Millar

Metallurgical investigations performed over the past year in the metallurgical laboratory of the United States Spring & Bumper Co. were described before the Los Angeles Chapter A.S.M. on May 27 by Edgar Brooker and Niels E. Hendrickson of that company. Mr. Brooker is likewise retiring chairman of the Los Angeles Chapter.

The fatigue life of spring steels subjected to bending stresses was the subject of the laboratory work. The steels investigated were A.I.S.I. C1080, A5150, A6150, A4150, and 10-B-50 grainal-treated. All specimens were $\frac{1}{4}$ in. wide by $\frac{1}{4}$ in. thick; about 400 have been tested to date.

A special testing machine of adjustable stroke had to be constructed. This machine deflected the sample as a simple beam, loaded at the center, between supports 20 in. apart. Stresses were in one direction only, and the frequency was 740 strokes per min. The bottom of the sample was in tension, and the top in compression.

Effect of tempering temperature was first determined. Groups of samples were tempered at 600, 700, and on up to 1100° F. They were then tested for fatigue life, with a stress range of 100,000 psi. (minimum 40,000 and maximum, 140,000 psi.). Data on A5150 steel illustrated the low fatigue life of samples tempered at 600° F., and the nine-to-one increase in number of cycles to first cracking

as the tempering temperature was increased to 1000° F. Tempering higher than this resulted in decreased fatigue life.

Additional samples were then heat treated, and new tests were run in which stress range, as well as maximum stress, was varied, the ranges being 40 to 120, 40 to 130, and 40 to 150 kips. From these data a typical Woehler curve could be plotted, and it was noted that a 20% drop in stress range increased fatigue life by 450%.

The A6150 and the 10-B-50 steels were found to give from 50 to 100% longer fatigue life than the A5150 steel, depending on the temperature of draw used. Grit blasting, and also overheating to 1900° F., reduced the fatigue life to 30% of normal. Shot-peening increased fatigue life about 500%.

More chrome-moly steel is on hand for future tests, and the authors expect, also, to test some 8650 steel, as well as conduct additional work on the steels already considered. Fatigue testing of this sort is an exceedingly slow process, and it will be some months before the authors feel they have enough authoritative data to justify publishing a paper.

Represents Furnace Equipment

James H. Knapp Co., Los Angeles, a firm of industrial furnace engineers and manufacturers, is also representing some leading equipment manufacturers on the West Coast. These now include the Eclipse Fuel Engineering Co., manufacturers of gas burners, mixers, control valves and blowers; the Partlow Corp., temperature controls and recorders; and Illinois Testing Laboratories, temperature and air velocity measuring instruments and dew point indicators.

9b—Ferrous

9b-32. Testing Speed Limitations for Committee A-1 Specifications for Steel. Lawford H. Fry. *American Society for Testing Materials, Preprint No. 98*, 1948, 3 pages.

Effect of speed in tension testing is considered in its relation to the acceptance specifications of Committee A-1 on Steel.

9b-33. Anisotropie elastique d'une feuille mince d'invar laminée a froid. (Elastic Anisotropy of a Thin Cold-Rolled Sheet of Invar.) Pierre-Jean Bouchet. *Comptes Rendus (France)*, v. 226, April 12, 1948, p. 1168-1169.

It was found that the determination of Young's modulus gave a more exact picture than the usual yield-point, tensile-strength, and elongation-to-failure tests.

9b-34. Production of Ferrite Single Crystals. F. G. Stone. *Metals Technology*, v. 15, June 1948, T. N. 3, p. 3-5.

Strain-anneal process for the production of iron tensile-test specimens, the gage length consisting substantially of a single crystal. The essential feature of the method is the continuous slow increase of furnace temperature during the grain-growth annealing treatment.

9b-35. What is Strength? J. B. Caine. *Foundry*, v. 76, July 1948, p. 80-81, 148, 150, 152, 154.

Shows that the standard tension test does not give a true picture of service strength. The development of stress concentration under non-uniform loading, whether due to the loading or to the shape of the part, is of primary importance. The pros and cons of the notched-impact test as a substitute for tension testing of steel castings. (To be continued.)

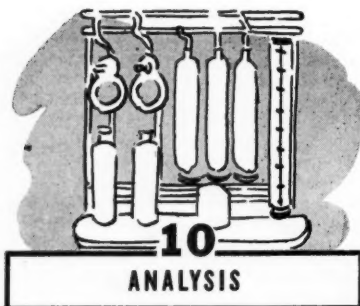
9d—Light Metals

9d-5. Crushing Strength of Aluminum Tubes. E. Creutz. *U. S. Atomic Energy Commission, MDDC-1448*, Sept. 17, 1943, 6 pages.

Method of measuring on a series of 2 S, cold-drawn tubes. Equations are given for long tubes to which hydrostatic pressure is applied externally.

For additional annotations indexed in other sections, see:

7a-134; 22b-223.



10a—General

10a-52. Spectrochemical Analysis: I. The Copper Spark Method. M. C. Bachelder, J. G. Conway, N. H. Hachtrieb, and A. E. S. Wildi. *U. S. Atomic Energy Commission, MDDC-511*, Dec. 12, 1946, 14 pages.

A method of extraordinary sensitivity is described for the determination of 30 elements. The meth-

od may be applied to the direct determination of impurities in solution, but finds particular application in cases wherein chemical separation of the impurities precedes their determination.

10a-53. Polarographic Behavior of Ions Using Sodium Fluoride as Supporting Electrolyte. (In English.) Philip W. West, James Dean, and Ernest J. Breda. *Collection of Czechoslovak Chemical Communication*, v. 13, Jan.-Feb. 1948, p. 1-10.

Study undertaken to determine the behavior since NaF is a relatively well-known complex former.

10a-54. Spectrochemical Analysis. F. Twyman. *Research*, v. 1, June 1948, p. 388-393.

Types of spectrochemical analysis and their applicabilities to both metals and nonmetals. 18 ref.

10a-55. Analyses by the Pile. *Industrial and Engineering Chemistry*, v. 40, July 1948, 10A, 12A, 16A.

New technique being developed by which atomic radiation can be used to quantitatively determine elements present in amounts of only a few parts per million.

10a-56. Relative Transition Probabilities in the Spectra of Ti I and Ti II. (In English.) L. H. M. Van Stekelenburg and J. A. Smit. *Physica*, v. 14, May 1948, p. 189-196.

The above probabilities for several lines in the two spectra were measured in emission and were compared with the results obtained by King and King who measured the oscillator strength by an absorption method. 10 ref.

10a-57. The Zeeman Effect in the First Selenium Spark Spectrum. (In English.) J. C. Van Den Bosch. *Physica*, v. 14, May 1948, p. 249-259.

The magnetic separation of several lines of the selenium spark spectrum. 18 ref.

10b—Ferrous

10b-40. Die Spektrochemie im Betriebslaboratorium der Eisen- und Stahlindustrie. (Spectrochemistry in the Laboratories of the Iron and Steel Industry.) H. Moritz. *Archiv für Metallkunde*, v. 1, March 1947, p. 115-121.

Comparative analysis of German and American practice.

10b-41. New Method for Determination of Tungsten in Steel Using B-Naphthoquinoline. (In Russian.) R. B. Golubtsova. *Zhurnal Analiticheskoi Khimii* (Journal of Analytical Chemistry), v. 3, March-April 1948, p. 118-122.

Compound is recommended for qualitative precipitation of small or large amounts of tungsten. Of all the elements present in steel, only W and Mo react with this compound. Reaction with Mo may be eliminated by proper adjustment of acidity.

10b-42. An Industrial Application of Geiger Muller Counters to the Analysis of Phosphorus in Steels. Ford R. Bryan and George A. Nahstoll. *Journal of the Optical Society of America*, v. 38, June 1948, p. 510-517.

Use of a Littrow quartz spectrograph equipped with Geiger-Muller photo-electron counter tubes for rapid and accurate determination.

10b-43. The Sampling and Analysis of Steel for Hydrogen. G. Derge, W. Peifer, and J. H. Richards. *Metals Technology*, v. 15, June 1948, T. P. 2362, 28 pages.

Previously abstracted from *Blast Furnace and Steel Plant*, v. 36, March 1948, p. 343-344, 355, 362. See item 10b-30, 1948.

10b-44. Apparatus for the Hot-Extraction

Analysis for Hydrogen in Steel. Clarence E. Sims and George A. Moore. *Metals Technology*, v. 15, June 1948, T. P. 2369, 10 pages.

General construction and operation of apparatus for quantitative hot extraction of hydrogen from steel for analytical purposes in a high vacuum up to 1050° C. for periods of 40 hr. or more.

10b-45. The Colormetric Estimation of Tungsten in High Speed Steels Using Ammonium Thiocyanate and Titanous Chloride. R. St. J. Emery and D. W. Curtis. *Metallurgia*, v. 38, June 1948, p. 113-114.

A method in which the Spekker Absorptiometer is used.

10b-46. A Direct-Reading Silicon Meter for Electrical Sheet Steels and a Note on Resistivity. N. F. Astbury and S. P. Roper. *Journal of Scientific Instruments and of Physics in Industry*, v. 25, June 1948, p. 191-193.

The product or resistivity and density of silicon iron sheets containing not more than 5% Si and 0.5% total trace elements is for practical purposes a linear function of Si content. Therefore, the potential drop between fixed points on a rectangular strip of fixed superficial size, carrying a current proportional to its mass, is a linear function of silicon content. The meter uses this principle. The effect of nonuniformity of silicon distribution on apparent resistivity.

10c—Nonferrous

10c-46. Spektrochemische Analyse fester Elektroden, insbesondere von Nichteisenmetallen. (Spectrochemical Analysis of Solid Electrodes, Especially Those Made of Nonferrous Metals.) H. Moritz. *Archiv für Metallkunde*, v. 1, March 1947, p. 109-114.

Practical application for qualitative and quantitative analysis, the latter especially for Zn and Zn alloys. 11 ref.

10c-47. Méthode de dosage du chrome dans les ferrochrome. (Method for Determination of Chromium in Ferrochromium.) Robert Lannet. *Revue de Metallurgie*, v. 44, Nov.-Dec. 1947, p. 380-381.

Method is characterized by the use of hot phosphoric acid to dissolve the sample. Titration of chromic acid is done by means of ferrous sulphate solution, using diphenylamine as indicator.

10c-48. Nouvelle réaction analytique du bismuth. (A New Analytical Reaction of Bismuth.) Marcel Jean. *Comptes Rendus (France)*, v. 226, Jan. 5, 1948, p. 55-56.

Silicotungstic acid forms, in the presence of rubenic acid, a white substance with bismuth ions. This precipitate turns brown when heated, the intensity of the color being proportional to the bismuth ion concentration.

10c-49. The Spectrographic Analysis of Tin and Tin-Lead Solders. D. M. Smith. *Tin Research Institute*, (England), 1948, 31 pages.

Present knowledge on the subject. Information on choice of equipment and suitable methods of analysis for specific purposes. 31 ref.

10c-50. The Quantitative Evaluation of Oxygen in Zirconium. W. C. Lillendahl, D. M. Wroughton, and E. D. Gregory. *Journal of the Electrochemical Society*, v. 93, June 1948, p. 235-247.

Two methods used and particular advantage of each. Oxygen analyses of Zr from three sources. Microstructures of heat treated zirconium (Turn to page 30)

ROSTER OF CHAPTER OFFICERS

AKRON CHAPTER

Chairman — A. C. Gunsaulus, 1487 Palisades Dr., Akron, Ohio
Vice-Chairman — C. R. Augden, 1631 Ohio St., Cuyahoga Falls, Ohio
Secretary — Lawrence W. Hudson, 1777 Tenth St., Cuyahoga Falls, Ohio
Treasurer — Charles F. Bunting, 232 Third St., N. W., Barberton, Ohio

BALTIMORE CHAPTER

Chairman — Thomas L. Moore, 4705 Keswick Rd., Baltimore 10, Md.
Vice-Chairman — C. Thompson Stott, Bethlehem Steel Co., Sparrows Point 19, Md.
Secretary-Treasurer — Donald W. Kalkman, 408 Evesham Ave., Baltimore 12, Md.

BIRMINGHAM CHAPTER

Chairman — Wm. W. Austin, Jr., 2101 South Hillside St., Birmingham 9, Ala.
Vice-Chairman — H. A. Caldwell, 2729 Bush Blvd., Birmingham 8, Ala.
Secretary-Treasurer — Joseph P. Flood, 124 South 16th St., Birmingham, Ala.

BOSTON CHAPTER

Chairman — L. Geerts, Republic Steel Corp., 36 Calumet Rd., Winchester, Mass.
Vice-Chairman — Horace Ross, Henry Disston & Sons, Inc., Mill Lane, Norwell, Mass.
Secretary-Treasurer — H. E. Handy, Saco-Lowell Shops, Biddeford, Me.

BRITISH COLUMBIA CHAPTER

Chairman — R. J. A. Fricker, Dominion Bridge Co., Ltd., 275 West First Ave., Vancouver, B. C., Canada
Vice-Chairman — J. R. Morris, 232 West Second Ave., Vancouver, B. C., Canada
Secretary-Treasurer — F. H. Stephens, 505 Metropolitan Bldg., Vancouver, B. C., Canada

BUFFALO CHAPTER

Chairman — Allan F. Wegener, Beals, McCarthy & Rogers, Inc., 50 Terrace, Buffalo 2, N. Y.
Vice-Chairman — Joseph M. Engel, 347 Parkside Ave., Buffalo 14, N. Y.
Secretary — J. H. Birdsong, 37 Niagara St., Buffalo 2, N. Y.
Treasurer — Frank B. Davis, Davis Steel Co., Box 73, Kenmore Branch, Buffalo 17, N. Y.

CALUMET CHAPTER

Chairman — P. H. Parker, 2647 Wick-er St., Highland, Ind.
Vice-Chairman — E. W. Taylor, S. G. Taylor Chain Co., P. O. Box 509, Hammond, Ind.
Secretary — E. T. Schwendemann, 4001 Grand Blvd., East Chicago, Ind.
Treasurer — Winfield S. Lienhardt, Metal & Thermit Corp., 151st St. & McCook Ave., East Chicago, Ind.

CANTON-MASSILLON CHAPTER

Chairman — Harry M. Morrow, R. D. No. 1, Navarre, Ohio
Vice-Chairman — Donald H. Feezel, 1453 Ridge Rd., N. W., Canton 3, Ohio

Secretary — L. A. Zeitz, East Ohio Gas Co., Canton, Ohio
Treasurer — John Welchner, Timken Roller Bearing Co., Harrison Ave., Canton 6, Ohio

CEDAR RAPIDS CHAPTER

Chairman — Irvin Lee Tucker, 1726 Seventh Ave., S. E., Cedar Rapids, Iowa
Vice-Chairman — M. C. Kendall, 325 32nd St., Drive S. E., Cedar Rapids, Iowa
Secretary-Treasurer — Geo. H. Taylor, 425 20th St., N. E., Cedar Rapids, Iowa

CHATTANOOGA CHAPTER

Chairman — J. H. Murdock, 3415 Tarlton Ave., Chattanooga, Tenn.
Vice-Chairman — Charles Smith Chisolm, The Wheland Co., Chattanooga, Tenn.
Secretary — F. E. Hite, 100 Market St., Chattanooga, Tenn.
Treasurer — Claude W. Sweeney, 616 Lindsay St., Chattanooga, Tenn.

CHICAGO CHAPTER

Chairman — Maurice J. Day, Carnegie-Illinois Steel Corp., 208 South La-Salle St., Chicago, Ill.
Vice-Chairman — L. E. Simon, Electro-Motive Div., General Motors Corp., La Grange, Ill.
Secretary-Treasurer — Andrew Engelhardt, Eclipse Fuel Engineering Co., 122 South Michigan Ave., Chicago 3, Ill.

CINCINNATI CHAPTER

Chairman — W. J. Klayer, Aluminum Industries, Inc., Werk Road & C. & O. R.R., Cincinnati, Ohio
Vice-Chairman — Stanton T. Olinger, Cincinnati Gas & Electric Co., P. O. Box 960, Cincinnati 1, Ohio
Secretary — Albert P. Fischer, E. F. Houghton & Co., 307 E. Fourth St., Cincinnati 2, Ohio
Treasurer — Albert J. Pfetzing, 140 Kinsey Ave., Cincinnati 19, Ohio

CLEVELAND CHAPTER

Chairman — S. M. Grant, W. S. Tyler Co., 3615 Superior Ave., Cleveland 14, Ohio
Vice-Chairman — Denton T. Doll, Brush Beryllium Co., 4301 Perkins Ave., Cleveland Ohio
Secretary — Wm. S. VanRensselaer, 302 Waverly Rd., Willoughby, Ohio
Treasurer — Carl L. Harvey, Lamson & Sessions Co., 1971 West 85th St., Cleveland 2, Ohio

COLUMBUS CHAPTER

Chairman — Mars G. Fontana, Consulting Metallurgical Engineer, 1681 Essex Rd., Columbus 12, Ohio
Vice-Chairman — James T. Gow, 1206 Lincoln Road, Columbus 8, Ohio
Secretary — R. E. Christin, Columbus Bolt Works Co., 291 N. Marconi Blvd., Columbus 16, Ohio
Treasurer — Samuel H. Yost, R.F.D. No. 1, Worthington, Ohio

DAYTON CHAPTER

Chairman — J. D. Loveley, 825 Belmont Park, N., Dayton 5, Ohio
Vice-Chairman — James Niehaus, 2447 King Ave., Dayton 10, Ohio

Secretary — Chester L. Gillum, Dayton Power & Light Co., Dayton 1, Ohio

Treasurer — Wm. McCrabb, 1030 Valley St., Dayton 4, Ohio

DES MOINES CHAPTER

Chairman — Forrest E. Allen, Iowa State College, Ames, Iowa
Vice-Chairman — Marvin L. Nelson, 2321 33rd St., Des Moines 10, Iowa
Secretary-Treasurer — F. J. Borgstedt, 917 31st St., Des Moines 12, Iowa

DETROIT CHAPTER

Chairman — Arthur H. Smith, Cadillac Motor Car Div., 2860 Clark Ave., Detroit 32, Mich.
Vice-Chairman — R. C. McCleary, 459 Chesterfield West, Ferndale 29, Mich.
Secretary-Treasurer — Howard L. Grange, General Motors Res. Lab., 485 W. Milwaukee St., Detroit 2, Mich.

DETROIT CHAPTER (TOLEDO GROUP)

Chairman — Gladwell W. Davison, National Supply Co., Box 899, M. O., Toledo 1, Ohio
Secretary-Treasurer — Nelson Meagley, 2617 Calverton Rd., Toledo 7, Ohio

EASTERN NEW YORK CHAPTER

Chairman — W. F. Hodges, 2058 Eastern Parkway, Schenectady, 8, N. Y.
Vice-Chairman — Chester L. Richards, Adirondack Foundries & Steel Inc., Watervliet, N. Y.
Secretary-Treasurer — Mary Jane Field, 222 First St., Troy, N. Y.

FORT WAYNE CHAPTER

Chairman — H. A. McAninch, Warner Automotive Parts Div., Auburn, Ind.
Vice-Chairman — George Jennings, National Heat Treating Corp., 230 E. Fourth St., Fort Wayne, Ind.
Secretary — C. A. Payntor, Salisbury Axle Div., 2100 West State St., Fort Wayne, Ind.
Treasurer — Walter B. Cheney, International Harvester Co., Bueter Rd., Fort Wayne, Ind.

GEORGIA CHAPTER

Chairman — R. E. Bobbitt, Jr., 733 Techwood Dr., Atlanta, Ga.
Vice-Chairman — Dwight L. Hollowell, 3174 Peachtree Dr., N. E., Atlanta, Ga.
Secretary — Michael F. Wiedl, Jr., 267 E. Paces Ferry Rd., N. E., Atlanta 5, Ga.

GOLDEN GATE CHAPTER

Chairman — G. B. Berlien, Industrial Steel Treating Co., Sixth & Fallon St., Oakland, Calif.
Vice-Chairman — Irving R. Leheney, Allegheny Ludlum Steel Corp., 36 Berry St., San Francisco 7, Calif.
Secretary — H. E. Krayenbuhl, Oliver United Filters Co., 2900 Glascock St., Oakland, Calif.
Treasurer — Frank B. Drake, Johnson Gear & Mfg. Co., Ltd., Eighth & Parker St., Berkeley, Calif.

(Turn to page 31)

wires with and without added oxygen. Microhardness measurements on a series of oxygen-doped wires provide a correlation between oxygen content and hardness.

10c-51. A Practical Series of Precious Metal Sulphides. (In Russian.) G. A. Medvedeva. *Zhurnal Analiticheskoi Khimii* (Journal of Analytical Chemistry), v. 3, March-April 1948, p. 103-108.

Arranges the sulphides in a series according to their water solubility. By boiling a mixture of sulphides containing Ir, Rh, Pt, Ru, Os, Pd, and Au; the three latter elements can be precipitated, which fact is believed to be of importance from an analytical point of view.

10c-52. Quantitative Determination of Lead in the Presence of Cations of the Second Analytical Group. (In Russian.) V. P. Shvedov, E. O. Gol'shtein, and N. I. Selemkova. *Zhurnal Analiticheskoi Khimii* (Journal of Analytical Chemistry), v. 3, March-April 1948, p. 109-112.

Method for separation of lead in the form of its oxybromide or oxyiodide from larger amounts of Ba, Sr, Ca, and Mg. The possibility of quantitative lead determination after dissolution of the oxyhalide in a solution of ammonium acetate and the subsequent precipitation of lead in form of lead chromate. 10 ref.

10c-53. Potentiometric Titration of +4 and +6 Selenium and Tellurium with Chromous Ion. James J. Lingane and Leonard Niedrach. *Journal of the American Chemical Society*, v. 70, June 1948, p. 1997-2000. 13 ref.

10c-54. Rapid Spectrographic Analysis of Cemented Carbide Compositions. John C. Redmond. *Steel*, v. 122, June 28, 1948, p. 86-88.

Development of a satisfactory technique, which involves grinding of the sample to an average diameter of 1 to 2 microns. Operating conditions, working curves, and a comparison of chemical and spectrographic results.

10c-55. Rarer Elements in Qualitative Analysis: Tungsten. Ting-Ping Chao and Jen-Tsi Yang. *Journal of Chemical Education*, v. 25, July 1948, p. 388-389.

Need for supplementing the conventional scheme of qualitative analysis, which includes only 24 cations. Procedure for separation and identification of tungsten.

10c-56. The Chemical Analysis of a Permanent Magnet Alloy. C. H. R. Gentry. *Metallurgia*, v. 38, June 1948, p. 108-113.

Alloys contain 15-30% Co, 12-20% Ni, 5-10% Al, 2-7% Cu, 0-10% Ti, 0-1% Si, 0-0.2% Mn, and remainder Fe. Procedures for the determination of each constituent. Use of photometric and polarographic methods for the determination of elements present in high percentages. 15 ref.

10c-57. Some Recent Advances in Analytical Technique. R. Belcher. *Industrial Chemist and Chemical Manufacturer*, v. 24, June 1948, p. 400-402.

Methods of detection and determination for molybdenum and copper; organic sulphur; and for micro-titration of organic acids.

10d—Light Metals

10d-14. Zur Frage der Herstellung von Eich-(Leit-) Proben für die spectrochemische Analyse von Aluminiumlegierungen. (Producing Standards for the Spectrochemical Analysis of Aluminum Alloys.) H. Moritz. *Archiv für Metallkunde*, v. 1, March 1947, p. 124-125.

Critical survey of the production of standard specimens used in the analysis.

10d-15. Probenahme und Herstellung von Elektroden zur raschen und sicheren spectrochemischen Ermittlung der Chargendurchschnittsgehalte bei Aluminium-Umschmelzlegierungen aus Gussblöcken (Masseln) und Grossraummischern. (Sampling and Production of Electrodes for Rapid and Reliable Spectrochemical Analysis of Samples of Scrap Aluminum Alloys From Pigs and Large Mixing Vessels.) H. Moritz. *Archiv für Metallkunde*, v. 1, March 1947, p. 125-137.

Advantages and disadvantages of spectrochemical analysis in investigation of the distribution of alloying elements within the scrap, determination of a suitable sample, and a rapid method for compounding the charge. Test samples from the mixer were analyzed to determine the degree of uniformity of mixing.

10d-16. Spectrochemische Bestimmung des Calciums in Magnesium-Legierungen. (Spectrochemical Determination of Calcium in Magnesium Alloys.) Muller-Uri. *Archiv für Metallkunde*, v. 1, March 1947, p. 137-138.

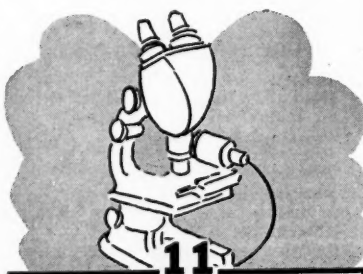
Recommended procedures for both the glass and the quartz spectrograph.

10d-17. Quantitative Spektralanalysen an dünnwandigen Leichtmetallproben. (Quantitative Spectral Analysis of Thin Samples of Light Metals.) Muller-Uri. *Archiv für Metallkunde*, v. 1, March 1947, p. 138-139.

Tools and methods for inserting thin sheets of light metal into an electrode mold.

For additional annotations indexed in other sections, see:

27a-101; 27d-11.



APPARATUS, INSTRUMENTS and METHODS

11-165. Nouvelle méthode d'étude des ferromagnétiques dans les champs alternatifs faibles. Application à quelques alliages. (A New Method for the Study of Ferromagnetic Materials in Weak Alternating Fields. Application to Certain Alloys.) Israël Epelboim. *L'Université de Paris Thesis*, Series A, No. 2128, 1946, 25 pages.

Method and apparatus is applicable to cases of induction or sinusoidal fields. It was applied to study of ferronickel alloys after different heat treatments.

11-166. A High Temperature-High Vacuum Apparatus. Leo Brewer, LeRoy A. Bromley, Paul W. Gilles, and Norman L. Lofgren. *U. S. Atomic Energy Commission*, MDCC-367, Oct. 1, 1946, 16 pages.

Pyrex glass apparatus by which temperatures up to 2500° C. were obtained with vacuums better than 10⁻⁴ mm. while hot. Pressures better than 10⁻⁴ mm. are obtainable in the cold. Design and operation are simple and times of heating and cooling are very short.

11-167. On Variation in Materials, Testing, and Sample Sizes. Leslie E. Simon. *American Society for Testing Materials*, Preprint No. 103, 1948, 5 pages.

Scientific sampling of materials; design of experiment; execution of tests; and interpretation of results.

11-168. Genomskinligt inbäddningsmedel för metallografiska prov. (Transparent Embedding Agent for Metallographic Work.) Roland Kiessling. *Jernkontorets Annaler*, v. 132, 1948, p. 110-111.

A method, using methyl methacrylate as transparent embedding agent.

11-169. Sur l'obtention de surfaces métalliques fraîches par abrasion mécanique dans le vide, et sur l'étude de ces surfaces par diffraction électronique. (The Production of Clean Metallic Surfaces by Mechanical Abrasion Under Vacuum, and Study of Such Surfaces by Electron Diffraction.) Robert Courtel. *Comptes Rendus (France)*, v. 226, March 8, 1948, p. 793-795.

New technique which is believed to have great potentialities.

11-170. Régulation automatique d'un four de laboratoire a resistance de kryptol. (Automatic Control of a Laboratory Furnace Having "Kryptol" Heating Elements.) E. Bonnier and G. Weiss. *Verres et Réfractaires*, v. 2, April 1948, p. 91-94.

Apparatus including circuits. ("Kryptol" is a type of graphite or carbon.) It is claimed that variations of temperature at 1500° C. may be reduced to ± 4 to 5° C.

11-171. An Electrolytic Tank for Exploring Potential Field Distributions. R. Makar, A. R. Boothroyd, and E. C. Cherry. *Nature*, v. 161, May 29, 1948, p. 845-846.

In a series of studies using solutions of CuSO₄ in distilled water of concentration varied between 0.5 and 8.0 g. per l., and Cu electrodes of various diameters, very accurate results were obtained with a measuring frequency of 1000 cycles/sec. and electrodes 0.5 mm. in diameter, provided that current per electrode was not less than a 5 milliamp. or that current density did not exceed 0.3 milliamp. per sq. mm. For such fine electrodes, steel sewing needles plated by the copper cyanide process are particularly suitable.

11-172. The Principles and Uses of Simulated Service Testing. L. L. Wyman. *Materials & Methods*, v. 27, June 1948, p. 63-67.

Uses in testing performance of jet-engine assemblies, fatigue, corrosion, and strength of structures.

11-173. X-Ray Diffraction Cameras for Metallurgical Specimens. D. W. Davison. *Engineers' Digest* (American Edition), v. 5, May-June 1948, p. 195-196. Condensed from *Journal of Scientific Instruments and of Physics in Industry*, v. 25, Jan. 1948, p. 7-10.

11-174. Application of Statistical Methods to Study of Gas-Turbine Blade Failures. Charles A. Hoffman and G. Mervin Ault. *National Advisory Committee for Aeronautics, Technical Note No. 1603*, June 1948, 27 pages.

Investigation to determine applicability of statistical methods as an approach to the evaluation of materials when formed into a particular service shape and operated at accelerated life conditions.

11-175. On the Temperature Dependence of the Intensity of Electron Diffraction of the Aggregate of Minute Crystals—A Possible Means to Determine the Cleavage Surface of Minute Crystals. Shigeto Yamaguchi and Tominosuke Katsurai. *Journal of Colloid Chemistry*, v. 1, 1948, p. 1-10. (Turn to page 32)



NEW CHAPTER OFFICERS (Cont.)

HARTFORD CHAPTER

Chairman—William W. Wight, Pratt & Whitney Div., Niles-Bement-Pond, Charter Oak Blvd., West Hartford, Conn.

Vice-Chairman—Francis J. Wolfer, R.F.D. No. 1, Berlin, Conn.

Secretary-Treasurer—John C. Mertz, 87 Cheney Lane, Newington 11, Conn.

LOS ALAMOS CHAPTER

Chairman—William W. Wellborn, 1366 41st St., Los Alamos, N. M.

Vice-Chairman—Arthur S. Coffinberry, Los Alamos Scientific Lab., P.O. Box 1663, Los Alamos, N. M.

Secretary-Treasurer—George L. Williams, Los Alamos Scientific Lab., P.O. Box 1663, Los Alamos, N. M.



LOUISVILLE CHAPTER

Chairman—John D. Graham, 2214 Winston Drive, Louisville, Ky.

Vice-Chairman—F. M. Klayer, 4147 Greenwood Ave., Louisville, Ky.

Secretary-Treasurer—William P. Culter, 1251 S. Brook St., Apt. 20, Louisville 3, Ky.

MAHONING VALLEY CHAPTER

Chairman—James E. Phillips, 37 N. Turner Rd., Youngstown 9, Ohio

Vice-Chairman—R. W. Justice, 860 Pennsylvania Ave., Youngstown, Ohio

Secretary-Treasurer—Robert J. Slee, Sr., 500 E. Midlothian Blvd., Struthers, Ohio

MANITOBA CHAPTER

Chairman—Edward James Edwards, 127 Bell Ave., Winnipeg, Manitoba, Canada

Vice-Chairman—Allan C. Montgomery, Manitoba Steel Foundries, Ltd., Selkirk, Manitoba, Canada

Secretary-Treasurer—E. M. Evans, Pydee & Evans Engineering Co., Ltd., 1018 Sherbrook St., Winnipeg, Manitoba, Canada

MICHIGAN COLLEGE OF MINING AND TECHNOLOGY CHAPTER

Chairman—Calvin C. Adler, Douglass Houghton Hall, Houghton, Mich.

Vice-Chairman—Bernard W. Boisvert, Box #312, Woodmar, Houghton, Mich.

Secretary-Treasurer—Gene C. Rohloff, D114 Lovell Rd., Houghton, Mich.

(Turn to page 33)



National President Francis B. Foley (Center) Is Flanked on the Left (Facing the Photograph) by W. W. Wight, Newly Elected Chairman of the Hartford Chapter, and on the Right by D. A. Tullock, Jr., Retiring Chairman for the 1947-1948 Season

INDIANAPOLIS CHAPTER

Chairman—J. Worthington, J. D. Adams Co., Box 853, Indianapolis, Ind.

Vice-Chairman—John W. Watson, 1451 South Tibbs, Indianapolis 44, Ind.

Secretary—J. E. Mitchell, 818 North Bancroft, Indianapolis 1, Ind.

Treasurer—W. E. Ellsworth, Claude S. Gordon Co., 31 E. Georgia, Indianapolis 4, Ind.

INLAND EMPIRE CHAPTER

Chairman—C. R. St. John, W. 2803 Upton St., Spokane, Wash.

Vice-Chairman—G. A. Garske, E. 1803 Illinois, Spokane 13, Wash.

Secretary-Treasurer—John M. Marchi, Trentwood Rolling Mill, Spokane, Wash.

KANSAS CITY CHAPTER

Chairman—Henry C. Deterding, Sonnen-Galamba Corp., Second & Riverview, Kansas City, Kans.

Vice-Chairman—John M. Goldsmith, Sheffield Steel Corp., Sheffield Station, Kansas City 3, Mo.

Secretary-Treasurer—J. A. Hall, Kansas City Structural Steel Co., 21st & Metropolitan, Kansas City 3, Kans.

LEHIGH VALLEY CHAPTER

Chairman—M. C. Fetzer, Carpenter Steel Co., Reading, Pa.

Vice-Chairman—R. J. Thomas, 257 Lee Ave., Pottstown, Pa.

Secretary-Treasurer—George A. Barker Jr., Springtown, Pa.

LOS ANGELES CHAPTER

Chairman—E. R. Babylon, Kaiser Co., 756 S. Spring, Los Angeles 14, Calif.

Vice-Chairman—James B. Morey, 705 Petroleum Bldg., Los Angeles 15, Calif.

Secretary-Treasurer—W. J. Parsons, Pacific Scientific Co., 1430 Grande Vista, Los Angeles, Calif.



Muncie Chapter Installed New Officers at Its April Meeting. Gene P. Davis (middle right), newly elected chairman, receives the Muncie Chapter bell from the outgoing chairman, Walter F. McCormack (middle left). At extreme left is Richard H. Burns, secretary-treasurer, and on the right is Dallas F. Lunsford, new vice-chairman

loid Science, v. 3, June 1948, p. 255-258.

Special camera constructed for the study of electron diffraction at high temperature; Fe_2O_3 , ThO_2 , Ni, and MgO powder crystals being used. From the change of the intensity of diffraction from various planes taking place at various temperatures, the cleavage faces of the powder crystals can be determined.

11-176. Measurement of Interfacial Tensions. J. C. Fisher. *Metals Technology*, v. 15, June 1948, T. N. 1, p. 1.

C. S. Smith has described a method for measuring the relative values of different solid-solid and solid-liquid interfacial tensions. Points out that the method will apply also to systems where two phases are fluid and one solid, and that absolute values of solid-solid, solid-liquid, and solid-vapor interfacial tensions can therefore be measured.

11-177. Quick Method for Detecting Preferred Orientation. Paul A. Beck. *Metals Technology*, v. 15, June 1948, T. N. 2, p. 2-3.

Extremely simple and rapid optical method for the qualitative detection of preferred orientation in annealed aluminum specimens.

11-178. Correlation of Optical and Electron Microscopy. J. S. Bryner. *Metals Technology*, v. 15, June 1948, T. P. 2364, 7 pages.

Specimen screen, containing an opening which can be absolutely identified and quickly located in the electron microscope and can be fastened to the silica film replica in such a position that the desired field on the specimen is located at the identifiable opening in the specimen screen.

11-179. A Method for Determining the Origin of Surface Defects in Rolled Steel Products. C. L. Meyette and V. E. Elliott. *Metals Technology*, v. 15, June 1948, T. P. 2368, 15 pages.

Defects in the ingot prior to rolling are characterized by the penetration of oxide surrounding the flaw. These are classed as steel-type defects. Those formed in either the primary or secondary rolling operations do not show any appreciable penetration. They are classed as mechanical-type defects. The method was applied to 10 grades of steel and was found applicable to all but one—18-8 stainless. Certain limitations of the method are considered with respect to rerolled products and to silicon steels.

11-180. A Simple Way of Photographing Spectra. R. A. Houstoun. *Nature*, v. 161, June 19, 1948, p. 973-974.

New technique in which the telescope object glass and the eyepiece were left in position and the camera was placed immediately after the eyepiece. The field of view of the spectrometer eyepiece was too narrow, but on substituting the eyepiece of a prismatic field glass which took in a cone of semivertical angle 128° instead of the previous 53°, the experiment succeeded; the visible spectrum covered the full breadth of the film and was in perfect focus from end to end.

11-181. Effects of Overheating Aluminum Determined by Color of Coating. P. A. Haythorne and H. B. Wiley. *Product Engineering*, v. 19, July 1948, p. 104-105.

Method whereby the structural properties of aluminum suspected to be impaired from accidental exposure to heat can be appraised from color changes in zinc chromate coated surfaces.

11-182. Electron Optical Schlieren Effect. *Technical News Bulletin* (National Bureau of Standards) v. 32, July 1948, p. 82-84.

New technique for quantitative study of electrostatic or magnetic fields that are not susceptible to any other type of investigation. Extension of the principle provides a powerful means of broadening present knowledge concerning space-charge fields, fields produced by contact potentials, wave-guide problems, and the microstructure of metals.

11-183. A New Method for Studying Fractures of Porcelain Enamelled Specimens. F. A. Peterson, Rodney A. Jones, and A. W. Allen. *Journal of the American Ceramic Society*, v. 31, July 1, 1948, p. 186-193.

A process which locates microscopic cracks in an enamel layer shows great promise in the study of different types of fractures. The stress conditions in the enamel-iron-enamel system before, during, and after thermal shock are analyzed.

11-184. Applied X-Ray Metallography. Norman P. Goss. *Steel*, v. 123, July 5, 1948, p. 98, 101-102.

First of a series designed for the beginning metallographer. Fields of application, fundamental results obtained by its use, advantages, and limitations. (To be continued.)

11-185. Neutron Diffraction and Associated Studies. E. O. Wollan and C. G. Shull. *Nucleonics*, v. 3, July 1948, p. 8-21.

Neutron diffraction techniques are compared with similar X-ray diffraction techniques. The experimental and theoretical description of the interaction of neutrons with crystals, molecules, and nuclei is related to present and potential applications to metallurgy, crystal structure, and certain fundamental nuclear studies. 33 ref. (To be concluded.)

11-186. Navy Instruments Photograph Instantaneous Phenomena. *Iron Age*, v. 162, July 15, 1948, p. 89.

11-187. A Refined Metallographic Technique for the Examination of Surface Contours and Surface Structure of Metals; Taper Sectioning. A. J. W. Moore. *Metallurgia*, v. 38, June 1948, p. 71-74.

The taper-sectioning technique for studying the surface features of metals. In many respects its use permits closer study than the normal cross-section micro-examination method.

11-188. The Positive Print Method of Measuring X-Ray Reflections From a Single Crystal. R. G. Wood and Gordon Williams. *Journal of Scientific Instruments and of Physics in Industry*, v. 25, June 1948, p. 202-204.

A photometer for use in Dawton's positive print method for determining the relative intensities of the above reflections. Determination of standardized processing conditions.

11-189. High-Speed Photography of Welding Arcs. F. Brailsford and K. F. Shrubbs. *Journal of Scientific Instruments and of Physics in Industry*, v. 25, June 1948, p. 211-213.

A camera designed and used for photographing the transfer of metal in the metallic-arc process of welding. It may be used at speeds up to 2500 pictures per sec. Operating technique and examples of work done.

11-190. An Improved Technique for Setting Single Crystals From Zero Layer-Line Photographs. Olga Weisz. *Journal of Scientific Instruments and of Physics in Industry*, v. 25, June 1948, p. 213-214.

Existing techniques were modified to permit easy determination of errors in the two goniometer arcs from a single composite stationary-crystal photograph taken with one

arc parallel to the beam, and the other perpendicular to it.

11-191. The Adjustment of a Crystal From X-Ray Rotation Photographs. A. Baisito. *Journal of Scientific Instruments and of Physics in Industry*, v. 25, June 1948, p. 215-216.

A method of correcting small errors in the setting of crystals. Complete rotation photographs are used. Three complete rotation photographs were taken at slightly different crystal settings, and the correct orientation was worked out by a simple graphical method.

11-192. Metallographische Auswertung von Oberflächen durch Flachschliff-Verfahren. (Metallographic Examination of Surface Layers Prepared by a Polishing Process.) H. Klemm. *Metall*, Nov. 1947, p. 79-83.

Methods used to prepare surfaces vertical to the surface of the specimen, thus making it possible to observe cross-sectional structure, which is especially useful on specimens coated with oxides, sulphides or other forms of corrosion, or with protective films. Formula for calculating true thickness of surface films.

For additional annotations indexed in other sections, see:

4c-39.

Precision
OPTICAL AND MEASURING INSTRUMENTS
A survey of our products sent on request
THE GAERTNER SCIENTIFIC CORPORATION
1229 Wrightwood Ave., Chicago 14, U.S.A.



INSPECTION and
STANDARDIZATION

12a—General

12a-69. Flow Inspection Cuts Rejects 90 Per Cent. *Factory Management and Maintenance*, v. 106, July 1948, p. 72-74.

Use of conveyors has made possible the inspection of precision parts within minutes after machining in a diesel-fuel-pump machine shop.

12a-70. How International Nickel Makes Precision Investment Castings. *Steel*, v. 123, July 5, 1948, p. 72-75.

12a-71. Electronic Counter. *Metal Industry*, v. 72, June 25, 1948, p. 527.

Construction of an ingenious machine for the counting of small objects of similar size, such as nuts and bolts.

12a-72. High Precision Surface Finish Standard to be Offered Metal Processing Industry. Clayton R. Lewis and Arthur F. Underwood. *Steel*, v. 123, July 19, 1948, p. 90-92, 124.

How the problem of making a master set of standard surface-finish specimens was solved after two years' study by G. M. and Chrysler engineers. Newly designed fine-line ruling machine will rule grooves in
(Turn to page 34)

NEW CHAPTER OFFICERS (Cont.)

MILWAUKEE CHAPTER

Chairman—Guenther H. Hille, 4652 S. Pine Ave., Milwaukee 7, Wis.
Vice Chairman—Muir L. Frey, 6419 W. Wisconsin Ave., Wauwatosa 13, Wis.
Secretary-Treasurer—Ernest G. Guenther, 1425 N. Jackson St., Milwaukee 2, Wis.

MONTREAL CHAPTER

Chairman—A. T. Loucks, 435 Berwick Ave., Town of Mount Royal, Quebec, Canada
Vice-Chairman—Edgar M. Seale, 620 Canada Cement Bldg., Montreal, P. Q., Canada
Secretary—Arch S. Wilson, P. O. Box 371, Station H, Montreal, P. Q., Canada
Treasurer—F. R. Rowell, 277 Duke St., Montreal, P. Q., Canada

MUNCIE CHAPTER

Chairman—Gene P. Davis, 1202 S. Jefferson St., Muncie, Ind.
Vice-Chairman—Dallas Lunsford, Perfect Circle Co., Box 191, New Castle, Ind.
Secretary-Treasurer—Richard H. Burns, Indiana Steel & Wire Co., Muncie, Ind.

NEW HAVEN CHAPTER

Chairman—W. D. France, 49 Kenilworth St., Waterbury 53, Conn.
Vice-Chairman—Michael Kober, Commercial Metal Treating Co., 89 Islandbrook Ave., Bridgeport 6, Conn.
Secretary—Harvey C. Irving, 872 South Arc, Stratford, Conn.
Treasurer—Henry L. Burghoff, 175 Mt. Vernon Ave., Waterbury, Conn.

NEW JERSEY CHAPTER

Chairman—Thomas G. Gilley, 4 Frazer Place, Cranford, N. J.
Vice-Chairman—John S. Ross, Ironbound Heat Treating Co., 360 Walnut St., Newark, N. J.
Secretary—Henry F. J. Skarbek, 2038 Pleasant Parkway, Union, N. J.
Treasurer—R. W. Thorne, Bennett Steel Treating Co., 246 Raymond Blvd., Newark 5, N. J.

NEW YORK CHAPTER

Chairman—Theron D. Parker, 147 Mercer Ave., Hartsdale, N. Y.
Vice-Chairman—Edwin M. Sherwood, Sperry Gyroscope Co., Inc., Great Neck, L. I., N. Y.
Secretary—Harold M. Malm, Little Falls Alloys, Inc., 189 Caldwell Ave., Paterson 1, N. J.
Treasurer—George A. Sands, 53 Fairway Lane, Manhasset, N. Y.

NORTH TEXAS CHAPTER

Chairman—Alfred Newman, 4023 Hawthorne, Dallas, Texas.
Vice-Chairman—A. L. La Bounty, Rt. 1, Box 287, Azle, Texas.
Secretary-Treasurer—Chris M. Heese, 6416 Greenway Rd., Fort Worth, Texas.

NORTHWEST CHAPTER

Chairman—Robert H. Lundquist, 326 Seventh Ave., North, Hopkins, Minn.
Vice-Chairman—Albert T. Ridinger, Metallurgical Control Lab., 2226 East Lake St., Minneapolis 7, Minn.
Secretary-Treasurer—Lillian K. Polzin, Minneapolis Chamber of Commerce, 100 Pillsbury Bldg., Minneapolis 2, Minn.

NORTHWESTERN PENNSYLVANIA CHAPTER

Chairman—Lloyd Toye, 318 Lowry Rd., R. D. 7, Erie, Pa.
Vice-Chairman—Robert L. Catlin, Raymond Mfg. Co., Corry, Pa.
Secretary-Treasurer—Walter H. Clemons, National Bearing Metals Corp., 125 Reynolds Ave., Meadville, Pa.

NOTRE DAME CHAPTER

Chairman—J. A. Grodrian, Bendix Aviation Corp., 934 North Niles Ave., South Bend 17, Ind.
Vice-Chairman—Francis T. McGuire, Sibley Machine & Foundry Corp., South Bend 23, Ind.
Secretary—E. G. Mahin, Dept. of Metallurgy, University of Notre Dame, Notre Dame, Ind.
Treasurer—H. J. McLellan, University of Notre Dame, 2605 Erskine Blvd., South Bend, Ind.

OAK RIDGE CHAPTER

Chairman—Lawrence K. Jetter, Monsanto Chemical Co., Clinton Lab., P. O. Box W, Oak Ridge, Tenn.
Vice-Chairman—George M. Adamson, Jr., 108 Pacific Rd., Oak Ridge, Tenn.
Secretary—Raymond Eugene Tate, 108 West Newcomb Rd., Oak Ridge, Tenn.
Treasurer—Clifton B. Graham, 101 Oak Lane, Oak Ridge, Tenn.

ONTARIO CHAPTER

Chairman—E. H. MacInnis, E. F. Houghton & Co. of Canada, Ltd.,

100 Symes Rd., Toronto 9, Ont., Canada

Vice-Chairman—R. C. Stewart, John Bertram & Sons Co., Ltd., Dundas, Ont., Canada

Secretary—G. Frank Knight, Railway & Power Engineering Corp., Ltd., 43-45 King William St., Hamilton, Ont., Canada

Treasurer—Thomas A. Moses, 1026 King St., East, Hamilton, Ont., Canada

OREGON CHAPTER

Chairman—Raymond C. Aungst, 1127 S. E. 10th Ave., Portland 14, Ore.
Vice-Chairman—A. C. Woolley, 1869 S. W. Broadway, Portland 1, Ore.
Secretary-Treasurer—Elton B. Clarke, Williamette Iron & Steel Co., 2860 N. W. Front Ave., Portland 10, Ore.

OTTAWA VALLEY CHAPTER

Chairman—G. T. Burgess, Burgess Tools, Ltd., 496 Mayfair Ave., Ottawa, Ont., Canada
Vice-Chairman—Irving C. Sheppard, Beach Foundry, Ltd., 89 Kenilworth St., Ottawa, Ont., Canada
Secretary-Treasurer—N. B. Brown, 31 Orrin Ave., Ottawa, Ont., Canada
Honorary Treasurer—Douglas A. Tetu, Box 877, Renfrew, Ont., Canada

PENN STATE CHAPTER

Chairman—James H. Keeler, R. D. No. 2, Bellefonte, Pa.
Vice-Chairman—Jack E. Fair, 249 South Barnard St., State College, Pa.
Recording Secretary—Frederick R. Lorenz, Jr., Lambda Chi Alpha, State College, Pa.
Corresponding Secretary and Treasurer—D. F. McFarland, 121 N. Atherton St., State College, Pa.

PEORIA CHAPTER

Chairman—Wallace Bornholdt, 119 Stever Court, Peoria, Ill.
Vice-Chairman—James R. Sloan, R.R. No. 2, Chillicothe, Ill.
Secretary-Treasurer—William E. Frank, 161 North Eleanor, Peoria, Ill.

PHILADELPHIA CHAPTER

Chairman—William J. DeMauriac, 238 Summit Rd., Springfield, Del. County, Pa.
Vice-Chairman—Edgar K. Spring, 508 Independence St., Philadelphia 26, Pa.
Secretary—Frederick Cooper, 107 Woodside Ave., Narberth, Pa.
Treasurer—George J. Kaiser, Pennsylvania Forge Corp., Milnor & Bleigh Sts., Tacony, Philadelphia, Pa.

PITTSBURGH CHAPTER

Chairman—Timothy W. Merrill, 501 Old Farm Rd., Pittsburgh 16, Pa.
Vice-Chairman—George A. Roberts, Vanadium-Alloys Steel Co., Latrobe, Pa.
Secretary and Assistant Treasurer—H. L. Walker, Box 6621, N. S. Station, Pittsburgh 12, Pa.
Treasurer—A. B. Wilder, The National Tube Co., Frick Bldg., Pittsburgh, Pa.

(Turn to page 35)



Douglas E. Boyd (left) of Joseph T. Ryerson & Sons, Inc., Retires as New York Chapter Chairman, and Is Succeeded by Theron D. Parker (Right) of Climax Molybdenum Co.

a polished specimen up to 10,000 lines per in. while holding pitch accurate to $\pm 2\%$.

12a-73. X-Ray Thickness Gauge. W. N. Lundahl. *Radio-Electronic Engineering*, v. 10 (Bound with *Radio News*, v. 39), June 1948, p. 14-15, 29.

Previously abstracted from *Electrical Engineering*, v. 67, April 1948, p. 349-353. See item 12a-47, 1948.

12a-74. Eddy Current and Electrical Method of Crack Detection. A. M. Armour. *Journal of Scientific Instruments and of Physics in Industry*, v. 25, June 1948, p. 209-210.

The principles of eddy-current crack-detection methods. Anomalies due to edge effects, sectional changes, and applicator attitude. Typical apparatus. Suggestions offered for further research on crack-testing nonmagnetic conductors. The electrical resistance method and examples of its successful application.

12b—Ferrous

12b-42. Tentative Hardenability Bands. 2135 H to 4340 H. *Metal Progress*, v. 53, June 1948, p. 840-B.

A data sheet.

12b-43. Faster Steel Cutting Promoted by Electric Measuring Gage. *Steel*, v. 123, July 19, 1948, p. 113.

Two installations of the device, on a saw and on a shear, have proved successful over a period of years.

12b-44. Radiology of Joints in Welded Piping for Power Plants. E. Thomas. *Institution of Mechanical Engineers Proceedings*, v. 158, June 1948, p. 1-5; discussion p. 5-8.

Methods and equipment for large and small pipes, and methods for evaluating the radiographs.

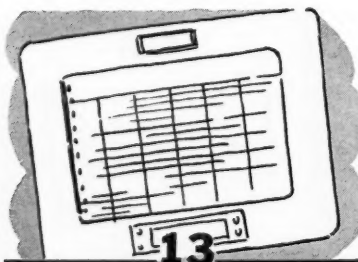
12d—Light Metals

12d-10. Tempers for Aluminum Alloys. *American Machinist*, v. 92, July 1, 1948, p. 129, 131.

Tables for the heat treatable wrought alloys and those not heat treatable, as an aid in correlating alloy designations with the old and new temper designations for the various forms of stock.

12d-11. Temper Designations for Aluminum Alloy Mill Products. *Reynolds Metals Technical Advisor*, v. 1, No. 8, p. 1-3.

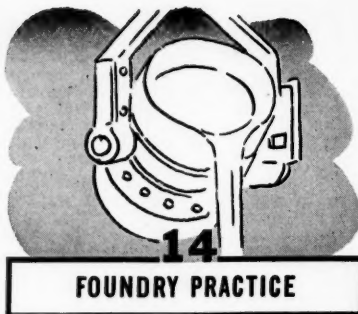
New additions and revisions of above system.



TEMPERATURE MEASUREMENT and CONTROL

13-30. Automatic Temperature Control. A. M. Adams. *British Coal Utilisation Research Association Monthly Bulletin*, v. 12, March 1948, p. 73-93.

Various methods applicable to diverse industrial processes. Circuit diagrams and an explanation of theory. 107 ref.



FOUNDRY PRACTICE

14a—General

14a-117. Practical Aspects of Machine Moulding. J. H. Peers. *Foundry Trade Journal*, v. 84, May 27, 1948, p. 507-510.

Equipment, applications, and operational details.

14a-118. The Norwegian Foundry Industry. John Sissner. *Foundry Trade Journal*, v. 84, May 27, 1948, p. 515-516.

14a-119. Solving the Foundry Shakeout Problem. J. W. Fair. *Machinery Lloyd*. (Overseas Edition), v. 20, June 19, 1948, p. 109-111.

Use of a mechanical shakeout machine.

14a-120. Precision Investment Casting. George A. Stetson. *Mechanical Engineering*, v. 70, July 1948, p. 579-580.

14a-121. High Output Achieved by Improved Investment Casting Process. K. J. Yonker. *Machine and Tool Blue Book*, v. 44, July 1948, p. 121-126, 128.

Special machines inject wax into pattern molds and the use of special 35-lb. capacity induction-melting furnaces.

14a-122. The "Lennox" Sand-Drier. *Foundry Trade Journal*, v. 84, June 10, 1948, p. 563-565.

Equipment for which the following advantages are claimed: absence of large rotating parts; small floor area; simplicity, easily handled by unskilled labor; delivery of cooled, dry sand up to 100 ft. from wet sand intake; high thermal efficiency; low maintenance costs; continuous operation; adaptable for use with most heating media.

14a-123. Patternmaking—A New Machine for Cutting Irregular Shapes. B. Levy. *Proceedings of the Institute of British Foundrymen*, v. 40, 1946-1947, p. B70-B75; discussion, p. B75-B76.

A mechanically operated machine for producing patterns, easily and economically, from wood and very soft metals.

14a-124. Centrifugal Casting. L. Northcott. *Proceedings of the Institute of British Foundrymen*, v. 40, 1946-1947, p. B77-B81; discussion, p. B81-B82.

A general discussion of various types, except precision casting.

14a-125. Influence of Design and Pattern-Making on Foundry Technique. T. H. Sneddon. *Proceedings of the Institute of British Foundrymen*, v. 40, 1946-1947, p. B83-B92.

Construction of first-class patterns for use in repetition or semi-repetition foundry. Throat ring, wheel, liquid channel, flexible coupling, ring, valve, bearing-block "V" cutter, roller, and manganese steel type castings.

14a-126. Application of Hydro-Blast to Dressing and Sand Recovery. Wm. Y. Buchanan. *Proceedings of the Institute of British Foundrymen*, v. 40, 1946-1947, p. B110-B119; discussion, p. B119.

A historical review and description of technique.

14a-127. Precision Casting for Mass Production. *Modern Industry*, v. 16, July 15, 1948, p. 123.

Photographs show some operations at Allis-Chalmers

14a-128. Zur Entwicklung von Glessverfahren mit Schwingungsbehandlung (Ultraschallglessverfahren). (Development of a Casting Process Utilizing Vibrations—Ultrasonic Casting Process.) H. J. Seemann and H. Menzel. *Metall*, Oct. 1947, p. 39-46.

Laboratory-scale research over a range of frequencies from mechanically or electromagnetically induced low-frequency vibrations to ultrasonic waves. The different types of apparatus. Specifications for large-scale experiments.

14a-129. Verbesserung der Anschnitt-Technik als Beitrag zur sparsamen Wirtschaft in Glessereien. (Improvement in Gating Practice for More Economical Foundry Operation) H. Reiningner. *Metall*, Oct. 1947, p. 46-54.

Gating practice is analyzed from the hydrodynamic point of view. Equations for rate of flow, reduction in pressure; and other factors affecting the flow of metal in molds.

14b—Ferrous

14b-81. Effect of Coke Quality on Blast Furnace Iron Tonnage. E. J. Gardner. *American Iron and Steel Institute, Preprint*, 1948, 13 pages.

A definite change in the coking quality of low or high volatile coal used in the blend produces a definite change in physical and chemical properties of the resulting coke with resulting effects on efficiency of iron production.

14b-82. Korrosionsbeständiger Stahlguss für die chemische Industrie und die Lebensmittelindustrie. (Corrosion Resistant Steel Castings for the Chemical and Food Industries.) Hans Hubscher. *Chimia*, v. 2, April 10, 1948, p. 78-82.

Production and properties of martensitic, ferritic, and austenitic stainless steels, and three methods of preventing intercrystalline corrosion and the resulting electrolytic action of the carbides on the grains.

14b-83. The Use of Basic Grade Pig Iron in Iron Founding. J. E. Rehder. *Canadian Metals & Metallurgical Industries*, v. 11, June 1948, p. 24, 30.

Principles involved in using any grade of pig iron differing from the foundry grade normally used. Various grades of pig iron and metallurgy of the process.

14b-84. Cupola Spout to Box Car in 75 Minutes. William G. Gude. *Foundry*, v. 76, July, 1948, p. 68-73, 134, 136.

Equipment and procedures used in the new gray-iron foundry.

14b-85. Centrifugal Casting of Soil Pipe. R. L. Farabee. *Foundry*, v. 76, July 1948, p. 89-91, 238-239.

Abstracted from *American Foundryman*, v. 13, April 1948, p. 134-136. See item 14b-61, 1948.

14b-86. Malleable Cast Iron. H. G. Hall. *Proceedings of the Institute of British Foundrymen*, v. 40, 1946-1947, p. B46-B59.

A general discussion. 20 ref.

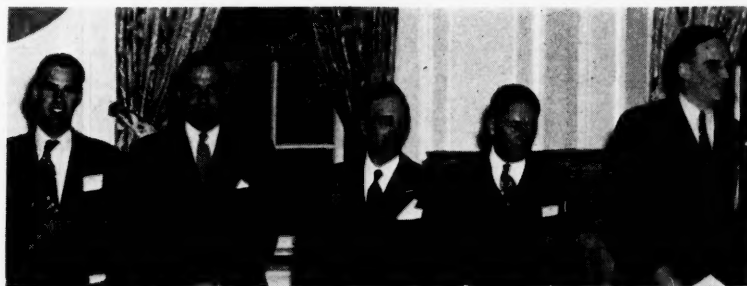
14c—Nonferrous

14c-42. Nickel-Silver Castings; An Investigation on the Effects of Gas Porosity. T. F. Pearson, W. A. Baker, and F. C. Child. *Metal Industry*, v. 72, June 11, 1948, p. 483-486; June 18, 1948, p. 506-507.

Work on a 60%-Cu, 20%-Ni, 20%-Zn alloy in which both high-frequency furnace and crucible melting were used. Shrinkage effects (Turn to page 36)



NEW CHAPTER OFFICERS (Cont.)



Left to Right at a Recent Philadelphia Chapter Meeting Are: H. H. Casey, Jr., Retiring Chairman; James Kirkland, a Coffee Speaker; Don Taylor of the Entertainment Committee; E. K. Spring, Vice-Chairman-Elect; and W. J. DeMauriac, New Chairman

PUGET SOUND CHAPTER

Chairman — Stuart C. Gillespie, 5050 37th N. E., Seattle 5, Wash.
Vice-Chairman — Richard W. Hargis, Isaacson Iron Works, P. O. Box 3028, Seattle 14, Wash.
Secretary-Treasurer — C. R. Jackson, E. F. Houghton & Co., 518 First South, Seattle, Wash.

PURDUE CHAPTER

Chairman — H. C. Dameron, Jr., 1320½ S. 19th St., Lafayette, Ind.
Vice-Chairman — John T. McCormack, Purdue University, Lafayette, Ind.
Secretary-Treasurer — Harold M. Graves, 2019 North 16th St., Lafayette, Ind.

RHODE ISLAND CHAPTER

Chairman — H. G. Muenchinger, R.D. No. 1, North Seituate, R. I.
Vice-Chairman — Melvin H. Knapp, 42 Slater Ave., Providence 6, R. I.
Secretary-Treasurer — Arthur S. Johnson, 227 Washington St., Lakewood, R. I.

ROCHESTER CHAPTER

Chairman — G. P. Palma, Bearium Metals Corp., 268 State St., Rochester 4, N. Y.
Vice-Chairman — Frank McDonald, 253 Dearcop Drive, Rochester 11, N. Y.
Secretary-Treasurer — N. J. Finsterwalder, Taylor Instrument Co., 95 Ames St., Rochester, N. Y.

ROCKFORD CHAPTER

Chairman — A. D. Wilcox, Eclipse Fuel Engineering Co., 814-818 South Main St., Rockford, Ill.
Vice-Chairman — Roy McGraw, National Lock Co., Rockford, Ill.
Secretary-Treasurer — H. E. Habecker, 545 Blackhawk Park Ave., Rockford, Ill.

ROCKY MOUNTAIN CHAPTER (DENVER GROUP)

Chairman — H. E. Fryer, 709 Park Lane Hotel, Denver 1, Colo.
Vice-Chairman — C. B. Carpenter, Colorado School of Mines, 1809 Ford St., Golden, Colo.
Secretary — J. F. Musgrove, 357 So. Downing St., Denver 7, Colo.
Treasurer — James Colasanti, 4522 Grove St., Denver 11, Colo.

ROCKY MOUNTAIN CHAPTER (PUEBLO GROUP)

Chairman — Howell Drummond, 1125 Summit Ave., Pueblo, Colo.
Vice-Chairman — Harold V. Gumma, 2410 St. Clair, Pueblo, Colo.
Secretary-Treasurer — Walter Munn, 2111 Elizabeth St., Pueblo, Colo.

ROME CHAPTER

Chairman — L. H. Decker, Revere Copper & Brass, Inc., Rome, N. Y.
Vice-Chairman — Gabriel J. Rich, 1698 Seymour Ave., Utica 3, N. Y.
Secretary-Treasurer — Walter E. Moulton, 143 Allen St., Sherrill, N. Y.

SAGINAW VALLEY CHAPTER

Chairman — H. A. Maloney, 1902 Colchester Rd., Flint 3, Mich.
Vice-Chairman — Frank A. Simons, 2914 Manor Drive, Midland, Mich.
Secretary-Treasurer — John H. Loree, 307 S. Franklin St., Flint 3, Mich.

ST. LOUIS CHAPTER

Chairman — E. J. St. Eve, 400 Melville Ave., University City 5, Mo.
Vice-Chairman — Louis Malpocker, 4006 Cedarwood, Pine Lawn 20, Mo.
Secretary-Treasurer — Lester W. Morrell, Revere Copper & Brass, Inc., 3908 Olive St., St. Louis 8, Mo.



Left to Right at the May Meeting of the St. Louis Chapter A.S.M. Are: R. C. Tittel of Owens-Illinois Glass Co., Retiring Chapter Chairman; Wayne Keller of Mallinckrodt Chemical Works, Speaker; E. J. St. Eve of Ampco Metals, Inc., Chairman-Elect; and L. Malpocker of Lincoln Engineering Co., Vice-Chairman-Elect

SAN DIEGO CHAPTER

Chairman — Earl Kops, 2956 "C" St., San Diego 2, Calif.
Vice-Chairman — John Crane, 1560 Tenth Ave., San Diego, Calif.
Secretary-Treasurer — Laird Gale, 273 West 29th St., National City, Calif.

SOUTHERN TIER CHAPTER

Chairman — W. B. Schoonover, International Business Machines Co., Endicott, N. Y.
Vice-Chairman — J. W. Ryan, Eclipse Machine Co., Elmira, N. Y.
Secretary-Treasurer — James S. Meyer, International Business Machines Corp., Endicott, N. Y.

SPRINGFIELD CHAPTER

Chairman — Rolland R. LaPelle, 54 Fernleaf Ave., Longmeadow, Mass.
Vice-Chairman — Joseph A. Tinsman, 208 Maple St., East Longmeadow, Mass.
Secretary-Treasurer — William S. Beecher, 32 Fenwick St., Springfield, Mass.
Assistant Secretary-Treasurer — Robert S. Burpo, professor of metallurgy, Massachusetts State College, Amherst, Mass.

SYRACUSE CHAPTER

Chairman — Wm. A. Pennington, 204 Huntleigh Ave., Fayetteville, N. Y.
Vice-Chairman — Walter L. Hodapp, 1462 S. State St., Syracuse 5, N. Y.
Secretary — John T. Mitchell, North St., Box 144, Chittenango, N. Y.
Treasurer — Ralph O. Brown, Brace-Mueller-Huntley, Inc., P. O. Box 1340, Syracuse 1, N. Y.

TERRE HAUTE CHAPTER

Chairman — Wm. R. Huff, 2503 Cruft St., Terre Haute, Ind.
Vice-Chairman — Stephen Reynolds, 2360 Seabury Ave., Terre Haute, Ind.
Secretary — M. E. Hansell, Rose Polytechnic Institute, Terre Haute, Ind.
Treasurer — N. A. Collora, 1028 S. Center St., Terre Haute, Ind.

TEXAS CHAPTER

Chairman — Charles F. Lewis, 6233 Navigation, Houston 11, Tex.
Vice-Chairman — Wesley A. Kuene-mann, 2711 Tanglely, Houston 5, Tex.
Secretary-Treasurer — H. C. Dill, 3815 Arnold St., Houston 5, Tex.
(Turn to page 37)

and effects of carbon, oxygen, sulphur, water vapor, and hydrogen.

14c-43. The Importance of Cores in Die-Casting Design. C. R. Maxon. *Mechanical Engineering*, v. 70, July 1948, p. 609-613.

Practical considerations involved in the design of cores.

14c-44. High-Duty Bronzes; The Slough Works of Langley Alloys Ltd. *Metal Industry*, v. 72, June 25, 1948, p. 517-520.

Production of the above and also of nickel-base alloy castings at British plant.

14c-45. The Effect of Casting Conditions on the Uniformity and Quality of Phosphor-Bronze Billets for Extrusion. J. C. Prytherch. *Proceedings of the Institute of British Foundrymen*, v. 40, 1946-1947, p. B1-B13.

Experimental procedure to determine best melting and casting procedure for small billets.

14d—Light Metals

14d-39. Pressure Casting Aluminum Matchplates in Plaster Molds. Stanley N. Touchman. *Foundry*, v. 76, July 1948, p. 76-79, 194, 196, 198.

Recommended procedures.

14d-40. Aluminum Alloy Castings. Floyd A. Lewis. *Foundry*, v. 76, July 1948, p. 92-95, 140.

Permanent mold casting of aluminum alloys.

For additional annotations indexed in other sections, see:

16a-65; 19c-16; 22a-152



15a—General

15a-9. We Sort Scrap to Get Top Prices. F. J. McLaughlin. *Factory Management and Maintenance*, v. 106, July 1948, p. 118-119.

15a-10. How Metallizing Solves Mine Maintenance Problems. Rick Mansell. *Engineering and Mining Journal*, v. 149, July 1948, p. 82-84.

Surface preparation and metal-spraying in reconditioning worn equipment parts.

15b—Ferrous

15b-37. Repairing a Steam Turbine Cylinder. J. C. Blankenship. *Power Generation*, v. 52, May 1948, p. 68-69.

Use of cleaning, welding and steel pins.

15b-38. Rehabilitation of Pipe Lines in Place, 3" to 24", by the Pittsburgh-Erie Process. Alfred B. Anderson. *Corrosion and Material Protection*, v. 5, May-June 1948, p. 6-8.

An electrolytic method for depositing an especially prepared bitumen compound from an aqueous solution on the pipe interior. New sectional cleaning machine to clean pipe before coating.

METALS REVIEW (36)

15b-39. Duplexing Steel Operation Affords Greater Use of Stainless Scrap in Melt. Dan Reebel. *Steel*, v. 122, June 28, 1948, p. 90, 93, 108.

Combination of high-frequency and arc-furnace melting is used to absorb excessive amounts of tube-mill scrap stainless. Up to 60% Cr-Ni scrap may be utilized.

15b-40. Gold Dredge Kept Digging. H. B. McGuire. *Welding Engineer*, v. 33, July 1948, p. 48-50, 64-65.

Renewal of worn Mn-steel buckets weighing 2½ tons apiece by hard surfacing. Amounts of material used, costs of labor and materials, and techniques.

15b-41. Salvage Operations Simplified by Magnetic Analysis. Arthur D. Stout, Jr. *Iron Age*, v. 162, July 1, 1948, p. 86-87.

Use to simplify separation of mixed steel grades. Use in inspection work and in measuring hardness or machinability, as well as detection of surface and subsurface flaws.

15c—Nonferrous

15c-5. Ueber die Verwendung von Umschmelzzink und Umschmelzzinklegierungen. (On the Use of Scrap Zinc and Scrap Zinc Alloys.) W. Wolf. *Metall*, Dec. 1947, p. 112-114.

Suitability of various types for different applications, as well as limitations.

15d—Light Metals

15d-5. Brush Anodic Films Onto Local Areas. E. Simon and F. W. Thomas. *American Machinist*, v. 92, July 1, 1948, p. 103-105.

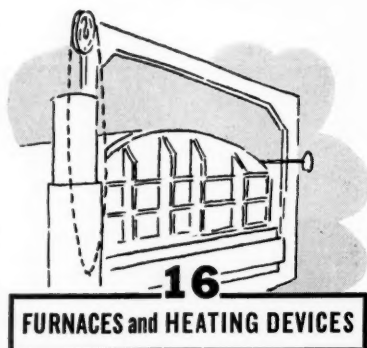
"Brush Anodizing" process used for repair jobs on Ni, Al, and Mg, when conventional tank anodizing is impractical. Only a few seconds are required to produce a satisfactory anodic film.

15d-6. Neuzzeitliche Leichtmetallschrott-Raffination. (Modern Methods of Refining Light-Metal Scrap.) Adolf Beck. *Metall*, Dec. 1947, p. 108-112.

Micrographs show the segregation of silicon from aluminum; graphs show the vapor pressure and boiling points of a number of metals and alloys; and diagrams show several types of vacuum furnaces used in the refining of aluminum.

For additional annotations indexed in other sections, see:

7c-24; 22b-213-217.



16a—General

16a-56. Sur la fusion continue des substances au four solaire. (Continuous Melting of Substance in a Solar Furnace.) Félix Trombe, Marc Foex, and Charlotte Henry La Blanchetais.

Comptes Rendus (France), v. 226, Jan. 5, 1948, p. 83-85.

To obtain appreciable amounts of molten material, continuous feeding with pulverized material is necessary. Device developed for this purpose.

16a-57. Determination of Optimum Schedules for Heating up Electric Furnaces. (In Russian.) B. S. Meshel. *Promyshlennaya Energetika* (Industrial Power), v. 5, Feb. 1948, p. 7-10.

A new formula permits rapid, simple, and exact determination. Methods of obtaining necessary data.

16a-58. A Comparison of Coal and Oil Firing. A. C. Dunningham. *Fuel*, v. 27, Jan-April 1948, p. 4-9.

Only small increases of efficiency can be expected with oil firing. This is confirmed by reference to actual results obtained on industrial boiler plants for which steam costs are estimated to be about 50% higher than with oil firing. As regards furnaces used in the nonferrous metallurgical and chemical industries there is much more scope for improved performance, both as regards efficiency and output, but in most cases costs are higher with oil. The most promising application of fuel oil from an economic standpoint consists in its use in small amounts to assist the combustion of low-grade fuels.

16a-59. The Use of Propane and Butane Gases. E. A. Jamison. *Industrial Heating*, v. 15, June 1948, p. 948, 950, 952, 954, 956, 958.

Miscellaneous industrial heating applications.

16a-60. Furnace Design for Better Utilization of Fuel. Floyd E. Harris. *Metal Progress*, v. 53, June 1948, p. 817-822.

Abstracted from *Steel*, v. 122, May 10, 1948, p. 90-94. See item 16a-48, 1948.

16a-61. Needs in Furnace Development and Fuel Utilization for the Metal Industry. F. E. Harris. *Steel Processing*, v. 34, June 1948, p. 313-317, 319.

Abstracted from *Steel*, v. 122, May 10, 1948, p. 90-94. See item 16a-48, 1948.

16a-62. Induction Heating of Hollow Objects by Means of Electroconductive Rods. (In Russian.) N. M. Rodigin. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 225-238.

A mathematical analysis of the problem. A series of equations are proposed for cylinders consisting of one or more layers.

16a-63. High-Frequency Heating of Bolt Blanks. *Machinery* (London), v. 72, June 24, 1948, p. 764.

16a-64. Needs in Furnace Development and Fuel Utilization for the Metal Industry. F. E. Harris. *Industrial Gas*, v. 26, June 1948, p. 8-11, 30.

Previously abstracted from *Steel*, v. 122, May 10, 1948, p. 90-94. See item 16a-48, 1948.

16a-65. The Cupola as a Precision Instrument. R. C. Tucker. *Proceedings of the Institute of British Foundrymen*, v. 40, 1946-1947, p. B66-B69; discussion, p. B69.

Design, raw materials, and operation. Necessity for a high degree of uniformity in melting rate, metal temperature, and daily quality.

16a-66. Electric Furnaces for the Wire Industry; Modern Equipment and Processes Described. Part I. H. J. Tucker and J. A. Monks. *Wire Industry*, v. 15, June 1948, p. 385-387.

Bell-base furnaces, pit and vertical furnaces, continuous strand-type furnaces, and continuous furnaces for bright annealing nonferrous material. (To be continued.)

(Turn to page 38)

NEW CHAPTER OFFICERS (Cont.)



New Officers of the Saginaw Valley Chapter Are (Left to Right): J. H. Loree of Chevrolet Motor Co., Secretary-Treasurer; H. A. Maloney of Buick Motor Co., Chairman; and F. A. Simons of Dow Chemical Co., Vice-Chairman

TRI-CITY CHAPTER

Chairman — George M. Eveleth, J. I. Case Co., Rock Island, Ill.
Vice-Chairman — James C. Erickson, 1838½ Ninth St., Moline, Ill.
Secretary-Treasurer — Gus Donohoo, Donohoo Steel Treating Co., Bettendorf, Iowa

TULSA CHAPTER

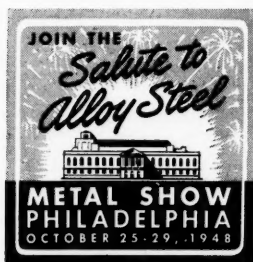
Chairman — C. W. Gay, 3526 E. Jasper, Tulsa 4, Okla.
Vice-Chairman — Lauren G. Kilmer, 1411 So. Oswego, Tulsa, Okla.
Secretary-Treasurer — J. H. Garrison, 2538 North Boston Place, Tulsa 6, Okla.

VIRGINIA POLYTECHNIC INSTITUTE CHAPTER

Chairman — H. T. Gregg, Jr., Box 96, Virginia Technical Station, Blacksburg, Va.
Vice-Chairman — J. M. Forbes, Box 446, Virginia Technical Station, Blacksburg, Va.
Secretary-Treasurer — R. W. Hamel, Jr., Box 679, Virginia Technical Station, Blacksburg, Va.

WASHINGTON CHAPTER

Chairman — H. M. Frazier, 1901 R. St., S. E., Washington 20, D. C.
Vice-Chairman — T. E. Hamill, 510 Ashford St., Silver Spring, Md.
Secretary-Treasurer — Fred M. Reinhart, National Bureau of Standards, Washington 25, D. C.



WEST MICHIGAN CHAPTER

Chairman — Albert W. Demmler, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.
Vice-Chairman — Eugene R. Good, 450 Fountain St., N. E., Grand Rapids, Mich.
Secretary — Stanley H. Davis, 1060 Ada Ave., Muskegon, Mich.
Treasurer — John C. Brill, 1217 Elliott St., S. E., Grand Rapids 7, Mich.

WICHITA CHAPTER

Chairman — Harold S. Wyckoff, Triplett & Barton, Inc., Beech Aircraft Corp., Wichita 1, Kans.
Vice-Chairman — Phillip Koerner, 830 Coolidge Ave., N., Wichita 3, Kans.
Secretary — R. S. Stoltz, 1101 South Santa Fe, Wichita 11, Kans.
Treasurer — Roscoe D. Howard, 960 Woodrow St., Wichita, Kans.

WORCESTER CHAPTER

Chairman — Leo P. Tarasov, Norton Co., Worcester 6, Mass.
Vice-Chairman — Orum R. Kerst, 21 Kenilworth Rd., Worcester 2, Mass.
Secretary-Treasurer — Lincoln G. Shaw, 16 Osceola Ave., Worcester, Mass.



The New Chairman and Vice-Chairman of the Worcester Chapter Were Photographed at the Annual Chapter Meeting in May. Left to right are Leo P. Tarasov, elected chairman; William H. Eisenman, secretary of the national society; Frank W. Curtis, consulting engineer, Induction Heating Corp., the principal speaker at the meeting; and Orum R. Kerst, elected vice-chairman of the chapter

WESTERN ONTARIO CHAPTER

Chairman — Frank G. Floyd, Kelvinator of Canada, Ltd., 1152 Dundas St., East, London, Ont., Canada
Vice-Chairman — Woodleigh B. Turner, Dominion Forge & Stamping Co., Ltd., 2480 Seminole St., Walkerville, Ont., Canada
Secretary — J. Roy Toll, Webster Air Equipment, Ltd., 140 Ann St., London, Ont., Canada
Treasurer — Raymond E. Barton, Canadian Mines Equipment, Ltd., 596 Hamilton Rd., London, Ont., Canada

YORK CHAPTER

Chairman — Chas. M. Strickler, General Machine Works, 515 Prospect St., York, Pa.
Vice-Chairman — Glenn Frank, R. D. No. 1, Camp Hill, Pa.
Secretary — Roy E. Livingstone, 1717 Stanton St., York, Pa.
Treasurer — Henry J. Yeager, P. O. Box 155, Lancaster, Pa.

**Make Your Hotel Reservations
See Page 61**

16b—Ferrous

16b-60. Precision Heat Treating Performed at Rochester Division of Lindberg Steel Treating Co. Part II. *Industrial Heating*, v. 15, June 1948, p. 1039-1040, 1042, 1044, 1046, 1078.

Pot, annealing, brazing, and induction furnaces; martempering bath; gas generators; and all auxiliaries. Inspection, cleaning and surface preparation, welding, and materials handling.

16b-61. Experimental Furnaces of the British Iron and Steel Research Association (B.I.S.R.A.). Max Davies. *British Science News*, v. 1, 1948, p. 2-5.

A blast furnace and an openhearth furnace and the experiments being conducted with them.

16b-62. Cubillos Com ar Quente. (Cupola Furnaces With a Hot Blast.) Mauricio Novinsky. *Boletim da Associao Brasileira de Metais*, v. 4, April 1948, p. 164-172.

The recuperation of heat in cupola furnaces studied from the point of view of coke conservation. Suitability of different types of cupola furnaces for use in Brazil.

16b-63. The Development of the Open-Hearth Furnace. Andrew McCance. *Engineering*, v. 165, May 21, 1948, p. 499; May 28, 1948, p. 526-527. A condensation.

Previously abstracted from *Iron and Steel*, v. 21, May 13, 1948, p. 198-200, 257.

16b-64. Blast-Furnace Stoves; Improved Design With Offset Combustion Chamber. J. E. MacDonald and John P. Marron. *Iron and Steel*, v. 21, June 1948, p. 295-296.

16b-65. Potentialities of the Pressure Blast Furnace. B. S. Old and E. R. Poor. *Mining and Metallurgy*, v. 29, July 1948, p. 385-387.

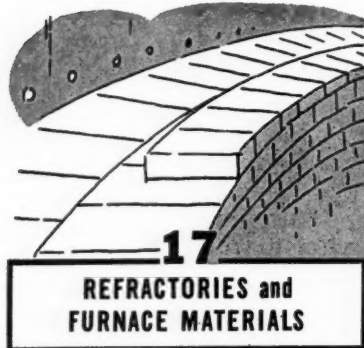
Test results which indicate that a notable increase is possible in pig-iron output with minimum expenditure.

16b-66. Melting Furnaces in German Steel Foundries. Hans Stein and Karl Roesch. *Metallurgia*, v. 38, June 1948, p. 85-89.

Trends in construction and use of various types.

For additional annotations indexed in other sections, see:

2b-138.



17
REFRATORIES and
FURNACE MATERIALS

17-61. The CaO-MgO-Cr₂O₃ Ternary System. Part I. A Partial Investigation of the CaO-Cr₂O₃ System. W. F. Ford and W. J. Rees. *Transactions of the British Ceramic Society*, v. 47, June 1948, p. 207-231.

Experimental procedures for determining the nature of the system as an aid in manufacture of refractory materials, as well as to clarify the constitution of slags obtained in working chromium steel.

METALS REVIEW (38)

17-62. Refractories Use With Oxygen Firing Still Offers Problems to Steel-makers. *Brick and Clay Record*, v. 112, June 1948, p. 66, 68.

Problems and results of using oxygen in respect to refractory life. 17-63. Refractory and Heat Resistant Concrete. S. B. MacDonald. *Steel Processing*, v. 34, June 1948, p. 318.

Properties and applications.

17-64. Steel Mill Refractories. *Industrial Heating*, v. 15, June 1948, p. 1028, 1030, 1032, 1034. Based on paper by L. A. Smith.

Uses of refractories in several typical steelmill applications.

17-65. Lightweight Firebrick Lining for Large Rotary Hearth Furnace. *Industrial Heating*, v. 15, June 1948, p. 1036, 1038.

The first use of lightweight insulating firebrick instead of heavy firebrick in a large rotary-hearth furnace has resulted in substantial fuel economies and saving in time and maintenance.

17-66. Soluble Silicates and the Refractories Industry. H. L. Bolton. *American Ceramic Society Bulletin*, v. 27, June 15, 1948, p. 229-234.

Properties and applications. 48 ref.

17-67. Considerations in the Use of Carbon Refractories in the Blast Furnace. W. S. Debenham. *Steel*, v. 123, July 12, 1948, p. 110, 113, 124, 127, 128, 130.

17-68. Basic Brick in the Open Hearth Furnace. Vernon W. Jones. *Blast Furnace and Steel Plant*, v. 36, July 1948, p. 813-816.

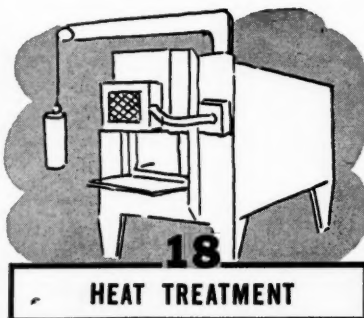
Developments in the sloping back-wall and chemically bonded magnesite brick and chrome-magnesia brick. Suspended construction and its advantages.

17-69. The Testing of Silica Bricks for Service in Open-Hearth Furnace Roofs. C. H. Bacon. *Transactions of the British Ceramic Society*, v. 47, July 1948, p. 233-251; discussion, p. 252-258.

Since the roof usually decides the length of the campaign between repairs, any improvement is of vital importance. Laboratory tests adopted for silica bricks show wide variation over a period. An attempt has been made to correlate test results on sample bricks with the service obtained in the furnace. A method of photographing furnace roofs at intervals during their lives.

For additional annotations indexed in other sections, see:

2b-136; 5a-41.



18
HEAT TREATMENT

18a—General

18a-15. Mechanized Induction Heating. Ray Vicker. *Steel Processing*, v. 34, June 1948, p. 302-303, 305.

Equipment and procedures.

18a-16. Heat Treating Research Aids

Development and Production at Mack Manufacturing Corporation. C. C. Roberts. *Steel Processing*, v. 34, June 1948, p. 310-312, 319.

Facilities.

18a-17. Fixtures Facilitate Induction and Flame Hardening. V. E. Hillman. *Iron Age*, v. 161, June 24, 1948, p. 90-94.

Ingenious fixtures for holding cast and wrought parts during heating.

18a-18. The Vital Role of Heat Treating Research. C. C. Roberts. *Automotive Industries*, v. 99, July 1, 1948, p. 42-43, 70, 72, 74.

Equipment and functions of a heat treating department in its development and production of vehicles and engines.

18b—Ferrous

18b-94. Hardhet och sprödhet hos hårdade mjuka kolstal. (Hardness and Brittleness in Quenched Soft Carbon Steels.) B. D. Enlund. *Jernkontorets Annaler*, v. 132, 1948, p. 91-104.

Investigations show that steels with a carbon content up to 0.20% become very brittle after quenching from a comparatively low temperature, whereas quenching from a higher temperature to maximum hardness makes them much more tough and ductile. Applicability to welding.

18b-95. Influence de divers elements d'addition sur le recuit de la fonte malleable a coeur noir: aluminium et bore. (Influence of Alloying Elements on the Annealing of Black-Heart Malleable Iron: Aluminum and Boron.) *Fonderie*, March 1948, p. 1087-1096.

A review. 17 ref.

18b-96. Cyclic Annealing of Alloy Steel Forgings. *Machinery* (London), v. 72, May 27, 1948, p. 653.

Briefly described, including equipment.

18b-97. Through-Carburizing of Low Carbon Steel Permits Purchasing and Fabricating Economies. Kenneth Rose. *Materials & Methods*, v. 27, June 1948, p. 68-71.

By adding 0.35% C after fabrication, fabricating advantages of low-carbon steel are made possible in a part which must be through-hardened for the intended service.

18b-98. Stress Relieving Large Gray Iron Castings for Diesel Engines. K. G. Presser. *Industrial Heating*, v. 15, June 1948, p. 932-934, 936, 938.

Methods and equipment.

18b-99. Magnetic Properties of Chromium-Nickel-Molybdenum Steels After Different Heat Treatments. (In Russian.) P. N. Zhukova and M. N. Mikhnev. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 187-196.

Investigated for two Cr-Ni-Mo steels and correlated with mechanical properties. Apparatus for magnetic control of heat treatment and method of its use.

18b-100. Residual Stresses in Case-Hardened Steel Specimens, Quenched From Temperatures Below Ac. (In Russian.) E. S. Yakovleva and M. V. Yakutovich. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 207-210.

Stresses were determined experimentally for 0.12%-C steel, case-hardened to a depth of 0.7 to 0.8 mm, and quenched from 810° C. in water.

18b-101. Heat-Treated Switch Points Show Increased Service Life. Horace C. Knerr. *Railway Engineering and Maintenance*, v. 44, July 1948, p. 717.

Tests, extending over a period of nearly a year, showed that heat treatment increased the useful life of switch points 200 to 800%, with

(Turn to page 40)

Further Applications For Isothermal Treatment Predicted

Reported by Hans J. Heine

Plant Metallurgist, Rockwell Mfg. Co.

A talk on "Transformations in Steel and the Jominy Curve" by Alexander R. Troiano, professor of metallurgy, University of Notre Dame, concluded Pittsburgh Chapter's lecture season on May 13. Opening with a brief introduction covering the fundamentals of isothermal transformation diagrams, he then discussed in detail the intermediate (bainite) reaction in steels of the S.A.E. 4340, 4140, 5140, 3312, 4812 and similar types.

Using S.A.E. 4340 as a typical example, he made the following generalizations:

1. The hardenability is usually limited by the intermediate "nose" in the diagram, not the pearlite-ferite nose.

2. The intermediate (bainite) reaction does not completely consume the austenite, the amount decomposed depending upon the reaction temperature. From no reaction at the very top of the intermediate temperature range, it progresses to complete decomposition of the austenite near the Ms point.

3. Austenite will be retained after reaction in the intermediate temperature range and may be very persistent. This occurs in steels which will not retain austenite by ordinary heat treating methods.

Actual isothermal heat treatment is at present used commercially to a limited extent, according to Dr. Troiano. A much wider study of physical properties is necessary before it can be adopted on a still larger scale. Possible additional applications are for general softening (such as for machining), for cooling large blooms and billets to save time and avoid flaking, and for various "trick" heat treatments.

Describing some data to be published soon, Dr. Troiano told how Jominy bars of three steels of widely differing composition (S.A.E. 2340, T1340 and 5140) were analyzed for the retention of austenite. The microstructural characteristics were carefully examined, and the presence of retained austenite resulting from partial bainite formation on continuous cooling was verified for all three steels.

Proceeding back from the quenched end of the Jominy bar, the amount of retained austenite increases to a maximum and then decreases for all three steels. At all corresponding positions on the Jominy bar, steel 2340 retained slightly more austenite than T1340 and substantially more

than 5140. It was further demonstrated that for equivalent positions on the three Jominy bars (equal hardness) the structures were widely different.

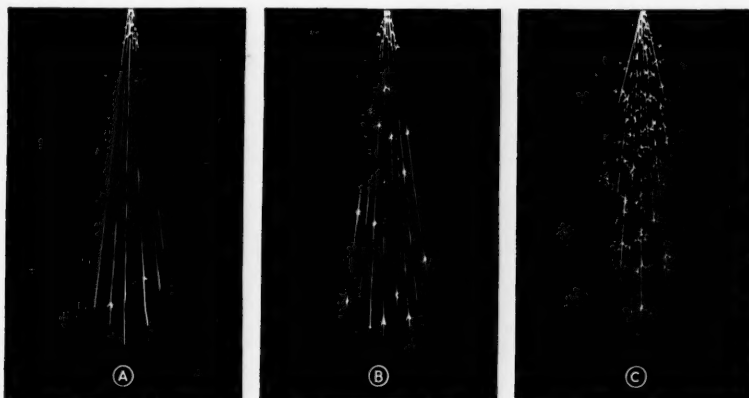
In conclusion, Dr. Troiano pointed out that the Jominy curve, as soon as it departs from a straight horizontal line representing essentially 100% martensite, is seriously limited as a tool for comparison of various steels and their performance in service, even when considering steels of comparable hardenability.

E. S. Davenport of the United States Steel Corp. was the technical chairman of the meeting.

Houghton Opens Toronto Plant

E. F. Houghton & Co. of Canada, Ltd., an affiliate of E. F. Houghton & Co. of Philadelphia, began operations in its new plant in Toronto on July 17, under the direction of E. H. MacInnis, vice-president and director of sales. The new plant will specialize in the manufacture of carburizers, quenching oils, cutting oils, heat treating salts and drawing compounds.

See Page 61 for Metal Congress Hotel Reservation Form
Mail Yours Now!



Mark your answers here. Carbon content of steel A. is — % B. is — % C. is — % Correct spark readings are given at lower left.

Can You Read These Sparks?

They Describe the Analyses of Three Steels

Steel bars of three different analyses gave off the sparks pictured above when touched by a revolving abrasive wheel. At Ryerson, we "read" these sparks to protect your production.

To the trained eyes of our experts, the spark pattern of a steel is as distinctive as a fingerprint. For example, the sparks shown here indicate straight carbon steels, with carbon content in the low, middle and high ranges. If chrome, nickel, molybdenum or other alloying elements were present, they would also be revealed in the spark pattern.

That's why spark testers patrol the bar sections of your nearby Ryerson plant. By checking all alloy and special quality carbon bar stock, they guard against mixed shipments. Help to assure the certified quality of Ryerson steels.

HERE ARE THE ANSWERS:

% 56 — C % 52 — B % 01 — A

Spark testing is only one of many extra steps we take to make Ryerson a steel source you can call with confidence. Another—the special Ryerson Report sent with each alloy shipment. It charts the results of hardenability tests, shows how to heat treat for desired mechanical properties and includes other helpful data.

So play safe. Avoid the possibility of mixed steels by ordering from your nearest Ryerson plant.

PRINCIPAL PRODUCTS

BARS—carbon & alloy, hot rolled & cold fin., reinforcing
STRUCTURALS—I beams, H beams, channels, angles, etc.
PLATES—Sheared & U. M., Inland
4-Way Floor Plate
SHEETS—hot & cold rolled, many types & coatings
TUBING—Seamless & welded mechanical & boiler tubes
STAINLESS—Alloy metal sheets, plates, tubes, etc.
MACHINERY & TOOLS

Joseph T. Ryerson & Son, Inc. Plants: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles, San Francisco

RYERSON STEEL

(39) AUGUST, 1948

consequent savings in labor and material.

18b-102. Some Aspects of the Overheating of Steel Drop Forgings. Part II: Nature of Overheating. H. J. Merchant. *Industrial Heating*, v. 15, June 1948, p. 964, 966, 968, 970, 972, 978.

The principal causes of, and factors influencing, overheating: An attempt to differentiate between overheated steel, severely overheated steel, and burnt steel. Methods used to detect overheating in alloy steel. (To be continued.)

18b-103. Quality Control Helps Make Better Rivets. Part II. Herbert Schneider. *Fasteners*, v. 5, no. 1, 1948, p. 8-9.

Effects of various annealing times and temperatures on Rockwell hardnesses and shear strength of 5/16-in. cold headed steel rivets.

18b-104. Stress-Relief Treatment of Iron Castings; Report of Sub-Committee T. S. 17 of the Technical Council. *Proceedings of the Institute of British Foundrymen*, v. 40, 1946-1947, p. B41-B45.

Recommendations based on survey of literature, and of data supplied by questionnaires. 11 ref.

18b-105. Gas Carburizing; a Review of the Equipment for the Wild-Barfield Process. *Automobile Engineer*, v. 38, June 1948, p. 215-216.

18b-106. New Compound Hardens Steel. *Engineering and Mining Journal*, v. 149, July 1948, p. 110.

A commercial product. "High-Speed-It," which does not contain cyanide and is non-poisonous; technique of application.

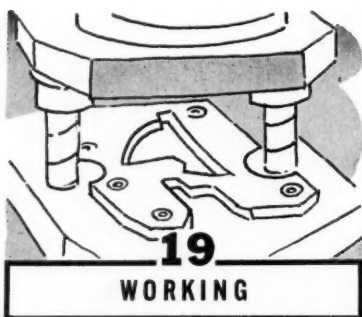
18d—Light Metals

18d-8. Über den Einfluss des Magnesiumgehaltes auf die Kaltaushärtung und Rückbildung der Kaltaushärtung von Aluminium-Kupfer-Magnesium-Legierungen. (Effect of Magnesium on Age Hardening and Stress-Relief Annealing of Cu-Mg-Al Alloys) Karl-Ludwig Dreyer. *Metall*, Sept. 1947, p. 3-8.

The effect of aging, Mg content, temperature, and heat treatment on the hardness of various alloys. The Cu content was 3.7-4.0%, and the Mg content was varied from zero to 2.02%.

For additional annotations indexed in other sections, see:

4d-17; 19b-89; 20a-273; 22b-211; 27a-102.



19a—General

19a-124. Influence d'une déformation sur le pouvoir thermo-électrique des métaux. (Influence of Deformation on the Thermoelectric Properties of Metals) Charles Crussard and Francis

Aubertin. *Comptes Rendus (France)*, v. 226, Jan. 5, 1948, p. 75-76.

By varying conditions such as grain size and rate of deformation, it was concluded that the thermoelectric effect of plastic deformation is induced by internal distortions which are much localized and sub-microscopic.

19a-125. Influence d'un écrouissage homogène sur le frottement intérieur d'un solution solide. (Influence of Uniform Cold Working on the Internal Friction of Solid Solutions). Christian Boulanger. *Comptes Rendus (France)*, v. 226, April 12, 1948, p. 1170-1171.

Investigated, using a paramagnetic solid solution, with a minimum amount of inclusions, and very low internal friction. Results indicate that no relationship exists between internal friction and elastic limit or hardness.

19a-126. Stampers Vitally Interested in Information Pertaining to Presses. E. A. Irwin. *Modern Industrial Press*, v. 10, June 1948, p. 6, 8, 48-49.

Recommended presswork procedures.

19a-127. Designing of "Trouble-Free" Dies. Part LXXXII. Types of Presses, Their Uses and Capacities. C. W. Hinman. *Modern Industrial Press*, v. 10, June 1948, p. 20, 34.

19a-128. Automatic Lubrication Helps Speed Operations and Lowers Maintenance Costs. Francis A. Westbrook. *Modern Industrial Press*, v. 10, June 1948, p. 28, 32, 34.

Application to punch presses.

19a-129. New Press Dept. Speeds Production of Sterilizers. Walter Rudolph. *Modern Industrial Press*, v. 10, June 1948, p. 36, 38, 40, 50.

Equipment and procedures.

19a-130. Versatile Press Department Is Vital Component in Navy's Leading Plane Maintenance Base. J. Delamar Harrell. *Modern Industrial Press*, v. 10, June 1948, p. 42, 44, 46.

19a-131. Bending Allowances and Flange Development. N. P. Skinner. *Machinery (London)*, v. 72, June 3, 1948, p. 675-678.

Data for any angle of bend without interpolation, and requiring only one addition or subtraction to determine the flange allowance to be added to the profile ordinate.

19a-132. Tool for Bending Lifting Eyes. R. Harris. *Machinery (London)*, v. 72, June 3, 1948, p. 679-680.

How lifting eyes, which are used for lifting crates, can be made by means of a hand-operated tool.

19a-133. The Calculations of Forces and Power Requirements for the Rolling of Metals. A. Geleji. *Engineers' Digest (American Edition)*, v. 5, May-June, 1948, p. 174-177. Translated and condensed from *Schweizer Archiv*, v. 13, Nov. 1947, p. 336-344.

Previously abstracted from original source. See item 19a-16, 1948.

19a-134. Application of the Basic Principles of Rolling in Roll Design. Ross E. Beynon. *Iron and Steel Engineer*, v. 25, June 1948, p. 37-59; discussion p. 59.

19a-135. Structural and Rail Mill Rolls Uses and Applications. A. F. Eisel. *United Effort*, v. 28, June 1948, p. 6-8.

19a-136. Gas-Turbine Blades; Materials and Forging Practice in Germany. *Iron and Steel*, v. 21, June 1948, p. 309-311. Based on F.I.A.T. Reports No. 1148, 1129, and 291.

Forming and welding of hollow turbine blades. Composition of the alloys used, and design and fabrication of a proposed motor-boat turbine.

19a-137. Metal Stampings Made by Specialists. Albert Kaser. *Western Ma-*

chinery and Steel World, v. 39, June 1948, p. 86-89, 112-113.

Equipment and procedures.

19a-138. Auxiliary Pre-Forming Mechanism. *Western Machinery and Steel World*, v. 39, June 1948, p. 116-117.

Reduced scrap loss, increased die life, and higher production rates are being realized by a new forging technique. "Maxirolling", as the process is called, is a rolling operation done in a "Maxipres" which prepares blanks with accurately reduced sections.

19a-139. Get More From Your Press Brake. Part I. Designing for the Press Brake. *Sheet Metal Worker*, v. 39, June 1948, p. 52-53, 60.

19a-140. Progressive Dies; How to Appraise Their Applicability. R. J. Harris. *Steel*, v. 122, June 28, 1948, p. 78-80, 104.

Factors to be considered in analyzing the technical and economic feasibility of application to specific jobs.

19a-141. Progressive Die Design. Part VI. C. W. Hinman. *Modern Machine Shop*, v. 21, July 1948, p. 166-168, 170, 172, 177, 178.

A precision die designed for production of transformer-coil laminations. This die will perforate, blank, and stack automatically in chutes at the rate of four blanks per press stroke.

19a-142. Why Dies Fail. C. A. Brenner. *Machinery*, v. 54, July 1948, p. 155-159.

Effects of poor design, bad operating techniques, and improper maintenance on die life. Suggestions for eliminating the common causes of die failure.

19a-143. World's Largest Mechanical Forging Press. *Machinery*, v. 54, July 1948, p. 160.

800-ton press for forging automobile crankshafts.

19a-144. Products Manufactured by Cold Roll-Forming. E. J. Vanderploeg. *Machinery*, v. 54, July 1948, p. 179-182.

Typical structural shapes, moldings and trim, tubes, coiled parts, and wide sections made by process.

19a-145. Preforming in Forging Operations. *Machinery*, v. 54, July 1948, p. 185-186.

Application of an auxiliary pre-forming mechanism—the "Maxiroll".

19a-146. Die That Forms Eight Right-Angle Bends in One Press Stroke. L. Kasper. *Machinery*, v. 54, July 1948, p. 197-199.

19a-147. Universal Perforating Equipment. *Tool & Die Journal*, v. 14, July 1948, p. 60, 62, 66.

Application of equipment for piercing holes up to 3 in. in diameter in mild steel 1/4 in. thick with standard equipment and larger holes with special units.

19a-148. Metallurgy of "Ampco 24" Aids Forming and Drawing of Stainless Steel. John C. Kemp. *Tool & Die Journal*, v. 14, July 1948, p. 68, 70, 116.

"Ampco 24" is a new bronze alloy which possesses unusual wear resistance because of a new intermetallic compound. Ten well-known companies tried out the alloy on the production line, and reported service lives two to five times those of bronze dies.

19a-149. Piercing Attachment. W. E. Allan. *Production Engineering & Management*, v. 22, July 1948, p. 65.

Movable "outboard-type" die set arrangement, solved the problem of piercing extra long shells of light-gauge metal on a standard punch press when the conventional setup could not be used because of the great shut-height required.

19a-150. The Extrusion of Plastic (Turn to page 42)

Sheet Through Frictionless Rollers. G. F. Carrier. *Quarterly of Applied Mathematics*, v. 6, July 1948, p. 186-192.

An approximation technique which leads directly to a justification of the one-dimensional theory for the cases where the cylindrical surfaces are frictionless and t/R is less than 1.

19a-151. Some Applications of the Press Brake. W. Earl Peters. *Machinery* (London), v. 72, June 10, 1948, p. 699-705.

Materials that can be formed; tolerances maintained; typical operations.

19a-152. Fundamentals of Forging Practice. Waldemar Naujoks. *Steel*, v. 123, July 5, 1948, p. 76-79, 104; July 19, 1948, p. 99-100, 102, 128.

Part three of series continues review of forging methods, steps used in increasing the diameter or square of a bar, punching holes in flattened stock, forging rings, and other smith and drop-forging techniques. Part four describes steps in upsetting and press forging and outlines practical rules regulating the application of these operations. (To be continued.)

19a-153. Design, Construction and Lubrication of Mill Couplings and Spindles. William L. Stover. *Iron and Steel Engineer*, v. 25, July 1948, p. 62-68; discussion, p. 68.

Includes diagrams and illustrations.

19a-154. Drawing or Forming Dies. Charles R. Cory. *Machinery* (London), v. 72, June 17, 1948, p. 727-732.

Decision as to whether a part can be shaped in a forming die or must be made in a more expensive drawing die—either single or double-acting—followed by a trimming die, depends primarily on the tendency of the part to wrinkle or tear. It also depends on thickness of the metal, depth of the draw, and height of the flange to be formed.

19a-155. Why Hydraulic Presses? Herbert Chase. *Tool & Die Journal*, v. 14, July 1948, p. 46-50, 116.

Advantages of the hydraulic press as compared with crank presses. (To be continued.)

19a-156. Trapped Stresses. Henry O. Fuchs. *Machine Design*, v. 20, July 1948, p. 114-118, 178.

How residual stresses can be intentionally produced by heat treatment, shot-peening, overstressing, and other methods, in order to help carry loads and to increase the strength of parts against static and fatigue failure. Miscellaneous applications such as prestressing of automotive leaf springs; overstressing gun barrels; and shot-peening automotive rear axles. Methods for trapping stresses include mechanical (overloading, burnishing, and shot-peening); thermal (selective quenching and shrink fitting); and metallurgical (carburizing, nitriding, and shallow hardening).

19a-157. Air Circuits for Press Control. W. J. Schupner. *Applied Hydraulics*, v. 1, July 1948, p. 13-15.

Each of the three control circuits described has a particular feature which makes it adaptable to certain press applications, especially in die forming, riveting, and in punch-press work.

19a-158. Dies for Drawing Complex Shapes; Design of Dies for Parts Requiring a Two-Way Punch Action or More Than One Drawing Operation. Charles R. Cory. *Machinery* (London), v. 72, June 24, 1948, p. 755-761.

19a-159. Forging Used to Reduce Scrap. *SAE Journal*, v. 56, July 1948,

p. 30-32. Based on **Development of Low Weight Forgings** by J. H. Friedman.

Previously abstracted from *Steel Processing*, v. 34, April 1948, p. 183-190, 192. See item 19a-75, 1948.

19a-160. Experimental Investigation of the Specific Pressure of Metal Flow During Drawing. (In Russian.) S. J. Gubkin. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, (Bulletin of the Academy of Sciences of the USSR, Section of Technical Sciences), Feb. 1948, p. 239-250.

Results for both ferrous and non-ferrous metals using a specially developed apparatus. Experimental data agreed closely with results of theoretical calculations, using a newly derived formula.

19b—Ferrous

19b-79. Advantages of Shot-Peening. Alberto Orefice. *Metal Progress*, v. 53, June 1948, p. 848-849.

Data on two series of tests on spring materials. Highly beneficial effects of shot-peening are indicated from tests on S.A.E. 9260, Si-Mn, leaf-spring stock and S.A.E. 1070 coil-spring stock.

19b-80. Complete New Press Line Makes Frames for the New Ford. P. D. Aird. *Modern Industrial Press*, v. 10, June 1948, p. 13-14, 18, 50.

19b-81. The Relationship Between Cold-working and Hydrogen Embrittlement. C. A. Zapffe and M. E. Haslem. *Wire and Wire Products*, v. 23, June 1948, p. 475-478, 527-529.

Samples of 1/16-in., 440-C, stainless-steel wire were cleaned and exposed to hydrogen, then tested in a single-bend constant-rate machine, immediately and also after exactly 30 and 90 sec., respectively. Effects of laboratory and mill annealing, cold work, and temperature of pickling, 10 ref.

19b-82. Nature of the "Forging Cross" in Steel. (In Russian.) V. I. Arkharov, N. V. Vyaly, and K. A. Malyshev. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 219-223.

Phenomenon consists of a clearly visible cross-shaped design which appears on the etched surface of specimens which were rotated during forging, between blows of the hammer, to positions at right angles to each other. Attempts to explain this phenomenon on the basis of a particular distribution of coarse and fine grains which is thus produced.

19b-83. 1948 Hudson Press-Work. *Tool & Die Journal*, v. 14, July 1948, p. 41-45.

19b-84. Tooling and Production of the Apex Fold-A-Matic Ironer. Carl F. Benner. *Tool & Die Journal*, v. 14, July 1948, p. 52-54, 56, 58, 108-109.

Drawing, trimming, and piercing the table top, and design and production of brackets and reinforcing members.

19b-85. Expands Wire Producing Facilities. *Steel*, v. 123, July 12, 1948, p. 114-116.

Jones & Laughlin's \$2,000,000 program includes installation of 55 new wire drawing machines, a rod cleaning unit, annealing furnaces, 14 new nail machines, and other plant improvements.

19b-86. Forging the "Impossible." Herbert Chase. *American Machinist*, v. 92, July 15, 1948, p. 114.

How fireman's tool having two prongs at right angles to each

other and to the handle was forged.

19b-87. Threads Rolled in Screw Machines. C. R. Morgan. *American Machinist*, v. 92, July 15, 1948, p. 116.

Special tool which gives high-finish threads up to 1/2-in. diameter on automatic machines.

19b-88. Shotpeening. Fred K. Landecker. *SAE Quarterly Transactions*, v. 2, April 1948, p. 191-194, 200.

Previously abstracted from condensed version in *SAE Journal*, v. 56, Jan. 1948, p. 65. See item 19b-9, 1948.

19b-89. Selection of Steels for Forging. Lester F. Spencer. *Steel Processing*, v. 34, June 1948, p. 297-301, 305.

A general review. Begins with steel manufacture, and reviews properties and effects of heat treatment. (To be continued.)

19b-90. Tooling Trick Raises Tool Life Five or Six Times. Frederick Lovell. *Fasteners*, v. 5, no. 1, 1948, p. 10-11.

Product required was a high-carbon U-bolt made from 5/8-in. stock. The die setup originally used consisted of solid pieces. Revision so as to use inserts of hard toolsteel made it possible to replace the worn portions of the tool only. In addition, the inserts could be used several times by turning end-for-end, or by turning them over.

19b-91. Operation and Maintenance of Automatic Preset Plate Mill Screw-down Control. *Iron and Steel Engineer*, v. 25, July 1948, p. 37-41; discussion, p. 41-42.

Joseph F. Skalka describes electrical features and R. G. Uhler mechanical features of above control on 120-in. plate mill.

19b-92. Novel Billet Descaler Aids Forging. *Iron Age*, v. 162, July 15, 1948, p. 79.

Descaling heated round billets in the forge shop of International Harvester Co. is accomplished by simple, motor-driven machine.

19b-93. Driven Backup Rolls Used in Cold Strip Mill. *Iron Age*, v. 162, July 15, 1948, p. 90-91.

A four-high, reversing cold strip mill designed to overcome drive deficiencies, strip breakage, and other disadvantages of the standard Steckel mill. Results of production use of an experimental 10-in. unit on light gages; specifications for a larger mill of the same design.

19b-94. Low Alloy High Tensile Steels. *SAE Journal*, v. 56, July 1948, p. 21-23. Based on **Practical Usage of Low Alloy High Tensile Steels in Automotive Structures** by C. L. Altenburger. (To be published in full in *SAE Quarterly Transactions*.)

Applications and advantages of the above steels as replacements for mild carbon steels. Forming of these alloys and relative influence of uniform and total elongation on a high-tensile steel and a low-carbon deep-drawing steel.

19c—Nonferrous

19c-15. Distribution of Deformation Throughout the Volume of Metallic Crystals During Formation of Slip Bands. (In Russian.) D. G. Kurnosov, N. M. Tronina, and M. V. Yakutovich. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 197-206.

Distribution in a zinc crystal was studied experimentally. It was shown that, for small deformations, only an insignificant part of the total deformation is localized in the slip band, most of it being distributed throughout the entire volume.

(Turn to page 44)

METALLURGICAL BOOKS

Welding Engineers Pocketbook. Chemical Publishing Co., New York, 1939, 240 p.

Zeyen, K. L. and Lohmann, Wilhelm. **Schweißen der Eisenwerkstoffe.** Verlag Stahl Eisen, Düsseldorf, 1943, 490 p.

(a) Electric Welding

Air Reduction. Arc Welding Instruction Course. Air Reduction, New York, 1940, 2 parts, 89 and 101 p.

Brooking, W. J. **Arc Welding Engineering and Production Control.** McGraw-Hill Book Co., Inc., New York, 1944, 347 p.

Chute, G. M. **Electronic Control of Resistance Welding.** McGraw-Hill Book Co., Inc., New York, 1943, 389 p.

Harcourt, R. H. **Electric Arc Welding; Prepared for Use in Schools and Colleges.** Stanford University, Calif., 1936, 108 p.

Hobart Brothers Co. **Arc Welding and How to Use It.** Ed. 3. Company, Troy, Ohio, 1938, 340 p.

Hobart Trade School. **Practical Arc Welding—a Textbook.** School, Troy, Ohio, 1942, 516 p.

Holslag, C. J. **Arc Welding Handbook.** Ed. 11. Photolith, Inc., Newark, N. J., 1941, 313 p.

James F. Lincoln Arc Welding Foundation. **Arc Welding in Design, Manufacture and Construction.** Foundation, Cleveland, 1939, 1409 p.

James F. Lincoln Arc Welding Foundation. **Maintenance Arc Welding.** Foundation, Cleveland, 1943, 234 p.

James F. Lincoln Arc Welding Foundation. **Studies in Arc Welding; Design, Manufacture and Construction.** Foundation, Cleveland, 1943, 1295 p.

Kinthead, R. E. **Practical Design for Arc Welding.** Hobart Brothers Co., Troy, Ohio, 1943-44, 2 v.

Lincoln Electric Co. **Lessons in Arc Welding.** Ed. 2. Company, Cleveland, 1941, 176 p.

Lincoln Electric Co. **Procedure Handbook of Arc Welding Design and Practice.** Ed. 4. Company, Cleveland, 1936, 819 p.

Lincoln Electric Co. **Procedure Handbook of Arc Welding Design and Practice.** Ed. 5. Company, Cleveland, 1938, 1012 p.

Lincoln Electric Co. **Procedure Handbook of Arc Welding Design and Practice.** Ed. 6. Company, Cleveland, 1940, 1117 p.

Lincoln Electric Co. **Procedure Handbook of Arc Welding Design and Practice.** Ed. 7. Company, Cleveland, 1942, 1267 p.

Lincoln Electric Co. **Procedure Handbook of Arc Welding Design and Practice.** Ed. 8. Company, Cleveland, 1945, 1282 p.

New York Shipbuilding Corp. **Shipyard Practice and Training Course; Arc Welding.** Corporation, New York, 1941, 254 p.

Potter, M. H. **Electric Welding.** American Technical Society, Chicago, 1939, 126 p.

Rice, William, Owens, A. A. and Shingluff, B. F. **Fundamentals of Electric Welding.** John C. Winston Co., Philadelphia, 1943, 138 p.

Sacks, R. J. **Theory and Practice of Arc Welding.** D. Van Nostrand Co., Inc., New York, 1943, 383 p.

(b) Gas Welding

Air Reduction. Oxy-Acetylene Welding and Cutting Instruction Course. Air Reduction, New York, 1942, 2 parts, 98 and 97 p.

Giachino, J. W. **Oxy-Acetylene Welding and Cutting: Learning Units, Rules, Standards.** Manual Arts Press, Peoria, Ill., 1942, 196 p.

Giachino, J. W. **Oxy-Acetylene Welding for Beginners; Lessons and Projects.** Manual Arts Press, Peoria, Ill., 1939, 96 p.

Hendricks, M. S. **Oxy-Acetylene Welder's Handbook.** Ed. 2. Welding Engineer Publishing Co., Chicago, 1939, 224 p.

Lincoln, R. B. and Kraus, Rudolph. **Gas Welding and Cutting.** International Textbook Co., Scranton, Pa., 1938, 71, 57, 69 and 68 p.

Linde Air Products Co. **Oxwelder's Handbook.** Ed. 14. Company, New York, 1937, 331 p.

Linde Air Products Co. **Oxwelder's Handbook.** Ed. 15. Company, New York, 1939, 331 p.

Linde Air Products Co. **The Oxy-Acetylene Handbook.** Company, New York, 1943, 587 p.

Potter, M. H. **Oxy-Acetylene Welding.** American Technical Society, Chicago, 1944, 130 p.

Tibbenham, L. **Welding of Cast Iron by the Oxy-Acetylene Process.** Sir

Isaac Pitman & Sons, Ltd., London, 1939, 88 p.

Von Borchers, Charles and Ciffrin, A. **Aircraft Torch Welding.** Pitman Publishing Corp., New York, 1941, 157 p.

(c) Soldering

Bonert, John. **Soldering for Workshop, Farm and Home—Soft and Hard Soldering.** Orange Judd Publishing Co., New York, 1941, 111 p.

Nightingale, S. J. and Hudson, O. F. **Tin Solders.** Ed. 2. British Non-Ferrous Metals Research Association, London, 1942, 117 p.

Taylor, L. S. **Successful Soldering.** McGraw-Hill Book Co., Inc., New York, 1943, 76 p.

4. Other Processes

(Forging, Rolling, Extrusion, Drawing, Stamping, Spinning, Machining)

Adam, A. T. **Wire Drawing and the Cold Working of Steel.** Ed. 2. H. F. & G. Witherby, London, 1936, 160 p.

American Society for Metals. **Machining of Metals.** Society, Cleveland, 1938, 177 p.

Association of Iron and Steel Engineers. **Modern Strip Mill.** Association, Pittsburgh, 1941, 358 p.

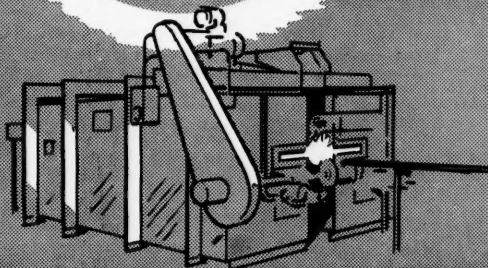
Colvin, F. H. **Turning and Boring Practice; Modern Machines, Tools, and Methods Used in Representative Plants.** McGraw-Hill Book Co., Inc., New York, 1936, 453 p.

(Turn to page 45)

**GAS FIRED. OIL FIRED
AND ELECTRIC
FURNACES**

EF

**ENGINEERED
TO FIT THE JOB**



THE ELECTRIC FURNACE CO.
WILSON ST. AT PENNA. R.R. *Salem-Ohio*

19c-16. Hubbed Cavities—Their Influence on Die Casting Design. H. M. Newell and Theodore T. Sossner. *Die Castings*, v. 6, July 1948, p. 33-34, 50-52.

Hubbing—usually called hobbing—is the process of creating a die cavity by displacement and flow of metal. This is done by forcing a hardened master, called the hub, into a block of soft steel. Methods and advantages for preparing die cavities.

19d—Light Metals

19d-35. Spun Glass Prevents Sticking of Magnesium to Stretch-Forming Blocks. *Machinery*, v. 54, July 1948, p. 199.

New technique to facilitate the cold forming of aluminum sheets.

19d-36. Deep Drawing Aluminum. *Machine and Tool Blue Book*, v. 44, July 1948, p. 189-190.

19d-37. Flow of Metal in Drawing Operations. H. J. W. Lengbridge. *Tool Engineer*, v. 21, July 1948, p. 21-24.

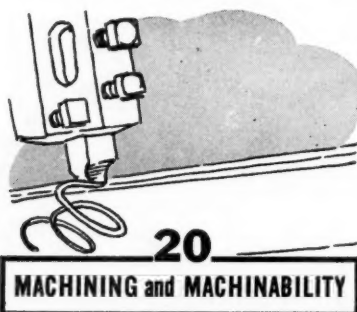
Mechanism of flow which occurs during pressing of aluminum. Four characteristics of the flow taking place during forming of a seamless cup. (To be continued.)

19d-38. Aluminum Body Stampings. *SAE Journal*, v. 56, July 1948, p. 27-29. Based on Aluminum for Body Stampings—Selection of Alloys, Drawings, and Joining, by J. H. Dunn, E. G. Kort, and G. O. Hoglund. (To be published in full in *SAE Quarterly Transactions*.)

Properties, potential applications, and fabrication techniques for production of automotive-body parts.

For additional annotations indexed in other sections, see:

4a-27; 18b-102; 21a-101; 21b-54.



20a—General

20a-252. Thread Cutting in the Lathe. Part III. Carl Thomas. *Power Generation*, v. 52, May 1948, p. 78-79.

Cutting Acme threads; threading tools for cutting square threads; Whitworth threads; formula for cutting metric screw threads; cutting multiple threads; and electrical-coil winding on the lathe.

20a-253. Self-Opening Die Heads. H. Balmer. *Machinery* (London), v. 72, May 27, 1948, p. 651-653.

Equipment for thread cutting.

20a-254. The Production of Cotton Spinning Spindles. *Machinery* (London), v. 72, June 3, 1948, p. 671-674.

Modern methods of turning and grinding.

20a-255. Lathe Set-up for Continuous Threading of Bar Stock. M. W. Purser. *Machinery* (London), v. 72, June 3, 1948, p. 682.

Method for threads on long pieces of bar stock by means of a die-head

rotated in the chuck of a small engine lathe, through which the bar is fed.

20a-256. Transfer Line Drills Ford Crankshafts. Walter G. Patton. *Iron Age*, v. 161, June 17, 1948, p. 72-76.

Special transfer-type drilling machine, utilizing step drilling, produces 60 crankshafts per hr. The tooling and operating sequences and other novel features of the line.

20a-257. Carbide Drills. Fred W. Lucht. *Iron Age*, v. 161, June 17, 1948, p. 83-90.

Three types now in use. Drill design, sharpening techniques, machines on which they are used, cooling and lubrication, the cutting speeds and feeds.

20a-258. Fine Drilling Attachment for Swiss-Type Automatic. *Machinery* (London), v. 72, May 27, 1948, p. 647.

20a-259. Novel Diamond Truing Devices for Grinding Jet Engine Turbine Blades. *Industrial Diamond Review*, v. 8, June 1948, p. 178-180.

20a-260. Use and Care of Diamond Tools for Truing Thread Grinding Wheels. *Industrial Diamond Review*, v. 8, June 1948, p. 183-185. Condensed from *A.S.M.E. Metal Cutting Data*, v. 3, Nov. 1947, p. 3-6.

20a-261. Servo Electronic Control of a Large Planing Machine. *Engineer*, v. 185, June 4, 1948, p. 542-543.

20a-262. Rapid Abrasive Wheel Cutting. *Machinery Lloyd*. (Overseas Edition), v. 20, June 19, 1948, p. 80-83.

Types of cutoff machines and suggestions for increasing wheel life.

20a-263. Sharpening Carbide Tools. Charles H. Wick. *Machinery*, v. 54, July 1948, p. 145-151.

Recommended methods and equipment, based on a comprehensive survey of manufacturers and users of carbide tools, grinding machines, and abrasive wheels. (To be continued.)

20a-264. Milling Complex Contours on Multiple-Spindle Machines. *Machinery*, v. 54, July 1948, p. 152-154.

Several typical setups.

20a-265. New Developments in Honing. (Concluded.) Charles H. Wick. *Machinery*, v. 54, July 1948, p. 162-169.

Points to be considered in the design of tools, fixtures, and machines for honing; outstanding applications of this process.

20a-266. Electrical and Electronic Controls for Form-Duplicating Machines. H. C. Town. *Machinery*, v. 54, July 1948, p. 193-196.

Details of the controls.

20a-267. Factors Influencing the Quality of Ground Gears and Worms. Part I. L. P. Tarasov. *Modern Machine Shop*, v. 21, July 1948, p. 124-130, 132, 134, 136, 138, 140.

Types of defects; how to recognize probable origin of surface defects and how to avoid them. (To be continued.)

20a-268. Carbides Boost Dairy Equipment Production at International Harvester. L. W. Court. *Modern Machine Shop*, v. 21, July 1948, p. 190, 192, 194, 196, 198, 200, 202.

20a-269. Ideas From Readers. *Modern Machine Shop*, v. 21, July 1948, p. 204, 206, 208, 210, 212.

Simplified Setup for Measuring Tapers, by R. Richards; Light Stampings From Universal Pump Jig, by Roger Isetts; Simple Method for Removing Broken Center Drill, by Fritz L. Keller; Holding Device for Coiled Spring Wire, by A. H. Waychoff.

20a-270. Reduce Maintenance Costs Through Automatic Lubrication of Machine Tools. Francis Westbrook. *Machine and Tool Blue Book*, v. 44, July 1948, p. 131-134, 136, 138-141.

Various types of lubrication systems.

20a-271. Production Problem Solved by Ingenious Tooling. Frank M. Scotten. *Production Engineering & Management*, v. 22, July 1948, p. 41-43.

How effective machine time was increased by ignoring precedent when designing a new broaching tool.

20a-272. Drill Jig Efficiency Increased by Swinging Leaf. Roger Isetts. *Production Engineering & Management*, v. 22, July 1948, p. 48.

Ingenious drill-jig design, which eliminates the necessity of removing the drill bushing for subsequent operations and which has a broad range of applicability.

20a-273. Business Method Machines; Addressograph-Multigraph Corporation, Cleveland, Ohio. *Production Engineering & Management*, v. 22, July 1948, p. 49-56.

Typical machine-shop equipment and techniques used in production. Heat treating, bonderizing, and welding.

20a-274. Surface Broaching Fixtures For Volume Production. (Concluded.) *Production Engineering & Management*, v. 22, July 1948, p. 57-61.

Recent developments in cost-saving fixtures and their application to various types of machines for surface broaching.

20a-275. Practical Aids for Working With Tapers. George Pfeil. *Production Engineering & Management*, v. 22, July 1948, p. 63.

Machine-shop methods for taper bores and shafts.

20a-276. Air-Tracer Scans Contours in Machining Operation. *Compressed Air Magazine*, v. 53, July 1948, p. 171-172.

Air-scanning device for simplifying turning, boring, and facing irregular contour work on lathes.

20a-277. High Grinding Wheel Speeds with Balanced Friction Drives. *Electrical Manufacturing*, v. 42, July 1948, p. 108-109.

Speeds up to 90,000 r.p.m. are attained with two motors, on opposite sides of the spindle, each with a large driving disk in direct frictional contact with the driven spindle.

20a-278. Practical Ideas. *American Machinist*, v. 92, July 1, 1948, p. 112-116.

Dressing attachment for crush forming of grinding-wheel surfaces, by Clifford T. Bower; finishing drills on cylindrical grinder, by Milton J. Curcio; templet-indicator setup planes brake dies from pre-cut sample, by Paul E. Wasseri; four-way tool-holding turret cuts engine-lathe time for small lots, by Dana J. Mulholland; sine bar dresses measured angles on outside grinding-wheel edges, by Philip Crain; duplicate punch-and-die taper cut by backhand boring system, by Gustave Remacle; shock resistant knockout for drawing die, by Roger Isetts; split collet and beveled pins for chucking long, thin work in an engine lathe, by F. H. Scriber; side-cutting shaper tool to produce short lengths of wire in gaging fixture, by J. R. Paquin; and other miscellaneous shop hints.

20a-279. Proper Jig Design Permits Its Use for Drilling of Two Different Parts. *Steel*, v. 123, July 12, 1948, p. 119, 130.

As applied to a pressure plate and a pressure plate cover.

20a-280. Air Fixtures Ease Machining and Assembly. R. E. Whinrey. *American Machinist*, v. 92, July 15, 1948, p. 92-95.

Applications of air clamping.

20a-281. Heaters Help Accuracy of Boring Machine. R. T. Rudolphson. *American Machinist*, v. 92, July 15, 1948, p. 96.

(Turn to page 46)

METALLURGICAL BOOKS

Colvin, F. H. **Turning and Boring Practice; Modern Machines, Tools, and Methods Used in Representative Plants.** Ed. 2. McGraw-Hill Book Co., Inc., New York, 1943, 496 p. (with F. A. Stanley).

Frey, C. J. and Kogut, S. S. **Metal Forming by Flexible Tools.** Pitman Publishing Corp., New York, 1943, 193 p.

Harcourt, R. H. **Elementary Forge Practice.** Ed. 3. Manual Arts Press, Peoria, Ill., 1938, 182 p.

Hinman, C. W. **Press Working of Metals.** McGraw-Hill Book Co., Inc., New York, 1941, 443 p.

Houghton, P. S. **Press Tool Practice.** Chapman and Hall, Ltd., London, 1941-1943, 3 v.

Jevons, J. D. **Metallurgy of Deep Drawing and Pressing.** Chapman and Hall, Ltd., London, 1940, 699 p.

Jevons, J. D. **Metallurgy of Deep Drawing and Pressing.** Ed. 2. Chapman and Hall, Ltd., London, 1941, 735 p.

Johnson, C. G. **Forging Practice.** American Technical Society, Chicago, 1938, 136 p.

Johnson, S. and Warby, J. **Drop Forging Practice.** C. Griffin & Co., Ltd., London, 1937, 108 p.

Miller, J. K. **Forging Dies.** International Textbook Co., Scranton, Pa., 1936, 73 and 88 p.

Moore, Thomas. **Practical Handbook of Smithing and Forging, Engineers' and General Smiths' Work.** Ed. 3. E. & F. N. Spon, Ltd., London, 1942, 258 p.

Naujoks, Waldemar and Fabel, D. C. **Forging Handbook.** American Society for Metals, Cleveland, 1939, 630 p.

Ohlhaever, Horst. **Der germanische Schmied und sein Werkzeug.** Curt Kabitzsch, Leipzig, 1939, 193 p.

Pearson, C. E. **The Extrusion of Metals.** Chapman & Hall, Ltd., London, 1944, 205 p.

Pomp, Anton. **Stahldraht; seine Herstellung und Eigenschaften.** Verlag Stahleisen, Dusseldorf, 1941, 275 p.

Puppe, Johann, ed. **Walzwerkswesen.** v. 3. Julius Springer, Berlin, 1939, 669 p.

Reagan, J. E. and Smith, E. E. **Metal Spinning for Craftsmen, Instructors, and Students.** Bruce Publishing Co., New York, 1936, 80 p.

5. Surface Treatment (In General)

American Society for Metals. **Surface Treatment of Metals.** Society, Cleveland, 1941, 427 p.

Canning, W. & Co., Ltd. **Practical Handbook on Electroplating, Polishing, Bronzing, Lacquering, and Enameling.** Ed. 13. Company, Birmingham, England, 1937, 359 p.

Coler, M. A. **Aircraft Engine and Metal Finishes.** Pitman Publishing Corp., New York, 1942, 128 p.

Hall, Nathaniel and Hogaboom, G. B. **Dictionary of Metal Finishing Chemicals.** Metal Industry Publishing Co., New York, 1945, 129 p.

Hedges, E. S. **Protective Films on Metals.** Ed. 2. rev. & enl. Chapman & Hall, Ltd., London, 1937, 397 p.

Institution of Production Engineers, London Research Department. **Surface Finish;** report by George Schlesinger. Institution, London, 1942, 231 p.

Lewis, Winifred. **Thin Films and Surfaces.** English Universities Press, Ltd., (for Temple Press, Ltd.), London, 1946, 70 p.

Machu, Willi. **Metallische Überzüge.** Ed. 2. Becker und Erler, Leipzig, 1943, 643 p.

Mattiello, J. J., ed. **Protective and Decorative Coatings.** Government

Printing Office, Washington, D. C., 1945, 349 p.

Mattiello, J. J., ed. **Protective and Decorative Coatings.** John Wiley & Sons, Inc., New York, 1941-46, 5 v.

Nelson, J. H. and Silman, H. **The Application of Radiant Heat to Metal Finishing.** Ed. 2. rev. Chapman & Hall, Ltd., London, 1945, 91 p.

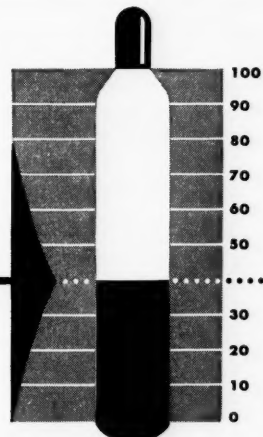
Reams, C. A. **Modern Blast Cleaning and Ventilation.** Penton Publishing Co., Cleveland, 1932, 213 p.

Samartsev, A. G. **Oksidnye pokrytiya na metallakh. (Oxide Coatings on Metals).** Izdatel'stvo Akademii Nauk S.S.S.R., Moscow and Leningrad, 1944, 107 p.

(Turn to page 47)

Compare the costs of DISSOCIATED AMMONIA

and HYDROGEN



For many metal treating applications, dissociated ammonia can reduce your hydrogen costs as much as 60% because: (1) the cost of dissociated ammonia is considerably less than hydrogen per thousand cubic feet of gas . . . (2) one cylinder of ammonia when dissociated supplies as much gas as approximately 34 cylinders of hydrogen, thus greatly reducing cylinder handling and storage problems. You'll find, too, that the low moisture content of dissociated ammonia (Dew Point -60°F.) results in brighter work. The lower pressure of the anhydrous ammonia in the cylinder simplifies control.

The coupon below will enable Armour's Technical Service Department to help you estimate the savings possible for your plant—to advise you on details of ammonia dissociating equipment and installation.

ARMOUR *Ammonia* DIVISION

Armour and Company
1355 West 31st Street • Chicago 9, Illinois
120 Broadway, New York, N. Y.

Mail this coupon today!

Please send me details on dissociated ammonia as a source of hydrogen.

Name..... Title.....

Firm.....

Address.....

City..... Zone..... State.....

Average Wkly. H₂ Req..... CF

Max. Hrly. H₂ Req..... CF

Use of thermostatically controlled electric heating elements in precision-boring machine to maintain center guide bearings at normal working temperature.

20a-282. New Applications for Subtractive-Lead Hobbing. J. W. Bergman. *American Machinist*, v. 92, July 15, 1948, p. 117-118.

Experiments proved that method was practical for hobbing any helix angle within the recommended range of lead of a given hobbing machine. Formulas for use with one of the standard hobbing machines. The subtractive-lead method is based on the principle of generating a lead by utilizing the index and feed mechanisms and nullifying or modifying this lead by utilizing the differential to produce a resultant helix angle or spur tooth.

20a-283. Concentricity to a Tenth. David Olsen. *American Machinist*, v. 92, July 15, 1948, p. 123.

Difficulty of holding size and concentricity of bushings with tiny holes is overcome with special fixture on surface grinder.

20a-284. Design and Construction of a 14-Ft. Gear Hobbing Machine; Methods Employed at the Works of Wm. Denny & Bros. Ltd., Dumbarton. E. Barback. *Machinery* (London), v. 72, June 10, 1948, p. 706-711.

20a-285. Cutting and Fragmentation Formulae. Emil Kuhn. *Tool Engineer*, v. 21, July 1948, p. 25-28.

Concludes review of studies made by the author and other contemporary investigators. 33 ref.

20a-286. Gadgets. *Tool Engineer*, v. 21, July 1948, p. 35-36.

Fixture for drilling and reaming various sized holes in gears (Robert Mawson); screw feed for tailstock of lathe (James Maltby); tool for making oil grooves on powder-metal bushings (Jos. Satoski); locator for drill jig (E. E. Woodman).

20a-287. Application of Hydraulic Equipment to Honing Machines. Earnest Y. Seborg. *Applied Hydraulics*, v. 1, July 1948, p. 20-21, 28.

Use of a two-pump hydraulic circuit to actuate a vertical honing machine. One pump is used to drive the hone reciprocating cylinder; the other, with its oil delivery divided, operates a clamping fixture, charges an accumulator, operates a spindle engagement clutch cylinder, and expands and collapses the hones.

20a-288. Production Processes—Their Influence on Design. Part XXXV. Superfinishing. Roger W. Bolz. *Machine Design*, v. 20, July 1948, p. 119-124.

The process and various typical applications.

20a-289. Improved Spindle Drive in Plain Miller. *Machine Design*, v. 20, July 1948, p. 146-148.

Gearing arrangement is such that spindle windup is held to a minimum and ample power at requisite speeds is available for all types of cutters.

20a-290. Practical Ideas. *American Machinist*, v. 92, July 15, 1948, p. 124-128.

Semi-automatic device to speed the production of short dowel pins (Clifford T. Bower); fly cutter and angled setup to cut elliptical holes on a universal-head milling machine (A. T. DeMello); snap gages made from mild steel bodies and hardened steel dowel-pin anvils (Allan Clarke); grinding marine-engine linkage by use of track-and-trolley positioner (William A. Schlesinger); unusual protractor for angles on ends of bars and tubes (Milton R. Hammond); cross-slide and compound slide assembly convert lathe

for milling; planing hyperbolic rollers (James Van Voast); magazine fixture feeds parts automatically into position for tapping (Glenn E. Shopbell); checking thread depth on lathe by sharply pointed toolbit (Federico Strasser); tooth rest made universal by adjustable ball joint (Daniel L. Mather); use of clock spring to lift shaper tool and protect work on return stroke (Daniel O'Leary); other miscellaneous shop hints.

20a-291. Spindle Noses for Lathes. *American Machinist*, v. 92, July 15, 1948, p. 137, 139.

Types recommended for different lathes. Based on new standard (A.S.A. B5.9-1948).

20a-292. Application of Servo-Electronic Control to a Planing Machine. *Machinery* (London), v. 72, June 24, 1948, p. 762-764.

20a-293. Surface Finish. F. C. Johansen. *Journal of the India Society of Engineers*, v. 13, Feb. 1948, p. 36-40; April 1948, p. 75-80.

First installment: methods used to obtain polished or smooth surfaces such as milling, grinding, lapping, electrolytic polishing; methods for determining the conditions of surfaces. Second installment: the various types of surface-finish meters and the physical effects of surface condition.

20a-294. The Manufacture of Turbine Blades for the Whittle Engine. T. A. Kestell. *Institution of Mechanical Engineers, Proceedings*, v. 158, June 1948, p. 66-82; discussion, p. 83-94.

Machine-shop techniques developed in Britain during the war.

20b—Ferrous

20b-51. Recommended Procedure for Bandsawing Mild Steel Mouldings. *Machinery* (London), v. 72, June 3, 1948, p. 681-682.

Technique for various shapes of steel moldings.

20b-52. Huge Grinder in Portland Plant. *Western Machinery and Steel World*, v. 39, June 1948, p. 97.

Hanchett surface grinder has a 48-in. segmental wheel and a 20-ft. traveling table. Use on large items.

20b-53. Fifteen-Second Shave Produces Distributor Shaft Drive Gears. *Steel*, v. 122, June 28, 1948, p. 103.

Semiautomatic underpass shaving machines turn out one finished gear every 15 sec.

20b-54. High-Speed Milling of Threads in Armor Plate. *Machinery*, v. 54, July 1948, p. 190-192.

With new attachment, a single operation now replaces the seven previously required and a thread can be milled in about 2 min. as compared with 30 min.

20b-55. Output of Meehanite Gears Speeded by Special Methods. Gerald Eldridge Stedman. *Production Engineering & Management*, v. 22, July 1948, p. 44-47.

Processing of Meehanite iron worms and gears for heavy-duty worm-gear drives.

20b-56. Automatic Wheel Machining. *Railway Mechanical Engineer*, v. 122, July 1948, p. 65-69.

Boston & Maine utilizes a 54-in. Bullard Man-Au-Trol for machining three sizes of diesel locomotive wheels at three times the former output.

20b-57. Lapping AB Slide Valves. *Railway Mechanical Engineer*, v. 122, July 1948, p. 81-82.

Device by which the average mechanic can produce a straight level surface with virtually no risk of rounded ends or sides in the finished seat.

20c—Nonferrous

20c-6. Shop Shots From Stewart Die Casting. *American Machinist*, v. 92, July 1, 1948, p. 108-109.

Machining of miscellaneous die-cast Al and Zn items.

20c-7. Broaching Stamped Parts. *Iron Age*, v. 162, July 15, 1948, p. 88.

Simultaneous broaching of identical parts as applied to telephone-relay part.

20c-8. Drilling Die Castings. *Die Castings*, v. 6, July 1948, p. 65-66.

Instances in which drilling is more practical than coring. Equipment and procedures for production drilling die-cast parts.

20d—Light Metals

20d-15. 1-Oz. Binocular Shell Machined to Close Tolerances. Anderson Ashburn. *American Machinist*, v. 92, July 15, 1948, p. 89-91.

Machining 14 surfaces of magnesium housing to provide precision assembly.

20d-16. Tooling the Wright Cyclone Forged Cylinder Head. F. E. Whitacre. *Tool Engineer*, v. 21, July 1948, p. 17-20.

Machining of new aluminum alloy containing 3.5-4.5% Cu, 1.8-2.3% Ni, 1.3-1.8% Mg, 0.45-0.90% Si, and 1.6% maximum impurities.

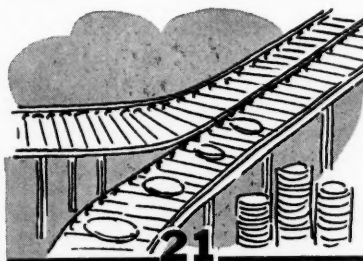
For additional annotations indexed in other sections, see:

9a-47; 27a-93-107.

NEW ENGLAND CARBIDE TOOL CO., INC.
Manufacturers of Precision Carbide Products

Cambridge 39

Massachusetts



MISCELLANEOUS FABRICATION

21a—General

21a-101. Seidelhuber's Five Point Program Cuts Costs—Produces Profits. Howard E. Jackson. *Modern Industrial Press*, v. 10, June 1948, p. 22, 24, 28, 49.

Procedures and equipment for manufacture of complete line of automatic electric hot-water heaters with both bronze and galvanized steel tanks ranging from 15 to 100-gal. capacities. Stamping, forming, and drawing; complete assembly; application of baked enamel; crating; and shipping.

21a-102. Bearing Manufacture; The Alpertons Works of the Glacier Metal Co., Ltd. *Metal Industry*, v. 72, June 11, 1948, p. 477-480, 482.

21a-103. Manufacture of Direct Drive Motors at Knapp-Monarch Company. Gerald Eldridge Stedman. *Machine and Tool Book*, v. 44, July 1948, p. 143-146, 148, 150.

21a-104. Ford's Radical Radiator Production Line. Chester S. Ricker. (Turn to page 48)

METALLURGICAL BOOKS

Schmaltz, Gustav. *Technische Oberflächenkunde*. J. Springer, Berlin, 1936, 286 p.

Simonds, H. R. and Bregman, A. *Finishing Metal Products*. Ed. 2. McGraw-Hill Book Co., Inc., New York, 1946, 352 p.

Swigert, A. M. *Story of Superfinish*. Lynn Publishing Co., Detroit, 1940, 672 p.

Vogel, Otto. *Handbuch der Metallbeize, Nichtisenmetalle*. Verlag Chemie, Berlin, 1938, 262 p.

(a) Plating, Galvanizing

Bablik, Heinz. *Galvanizing*. Translated by M. Juers-Budicky. Ed. 2, rev. & enl. E. & F. N. Spon, Ltd., London, 1936, 367 p.

Bilfinger, Robert. *Das Hartverchromungsverfahren. Die elektrolytische Abscheidung von Hartchrom: Arbeitstechnik und Anwendungsgebiete*. H. Beyer, Leipzig, 1939, 148 p.

Bilfinger, Robert. *Das Hartverchromungsverfahren. Die elektrolytische Abscheidung von Hartchrom: Arbeitstechnik und Anwendungsgebiete*. Ed. 2, rev. & enl. H. Beyer, Leipzig, 1942, 235 p.

Daesen, J. R. *Galvanizing Handbook*. Reinhold Publishing Corp., New York, 1946, 130 p.

Eckardt, Walter and Krämer, Oskar. *Herstellung hochwertiger Metallüberzüge*. G. Leuze, Leipzig, 1939, 168 p.

Electrochemical Society. *Modern Electroplating*. Society, New York, 1942, 399 p.

Fields, S. and Weill, A. D. *Electroplating*. Ed. 3. I. Pitman & Sons, Ltd., London, 1938, 381 p.

Fields, S. and Weill, A. D. *Electroplating*. Ed. 4. I. Pitman & Sons, Ltd., London, 1943, 437 p.

Fields, S. and Weill, A. D. *Electroplating*. Ed. 5. I. Pitman & Sons, Ltd., London, 1945, 483 p.

Field, Samuel. *Principles of Electrodeposition (The Electrochemistry of Electroplating)*. I. Pitman & Sons, Ltd., London, 1944, 314 p.

Glasstone, Samuel. *The Fundamentals of Electrochemistry and Electrodeposition*. American Electroplaters Society, New York, 1943, 90 p.

Hoare, W. E. and Hedges, E. S. *Tinplate*. Edward Arnold and Co., London, 1945, 292 p.

Krause, Hugo. *Galvanotechnik*. Ed. 8, rev. Max Jänecke, Leipzig, 1937, 275 p.

Krause, Hugo. *Galvanotechnik*. Ed. 10. Max Jänecke, Leipzig, 1941, 269 p.

Krayevskiy, P. B. and Adamovich, L. P. *Control of the Electrolyte in Electroplating Baths and of Coatings*. (In Russian.) Metallurgizdat, Moscow, 1941, 196 p.

Plater's Guidebook. *Metal Industry Publishing Co.*, New York. Ed. 5, 1936, to Ed. 7, 1938.

Plating and Finishing Guide Book. *Metal Industry Publishing Co.*, New York. Ed. 8, 1939, to Ed. 15, 1946.

Richards, E. S. *Chromium Plating*. Ed. 2. J. B. Lippincott Co., Philadelphia, 1936, 131 p.

Rosslyn, J. *Electroplating and Anodizing; Covering Gold, Silver, Nickel, Copper, Chromium, Cadmium and Zinc Plating*. Chemical Publishing Co., New York, 1941, 224 p.

Spowers, W. H., Jr. *Hot-Dip Galvanizing Practice*. Penton Publishing Co., Cleveland, 1938, 194 p.

Young, C. B. F. *Chemistry for Electroplaters*. Chemical Publishing Co., Inc., Brooklyn, N. Y., 1945, 205 p.

(b) Enameling, Coloring, Spraying

Andrews, A. I. and Cook, R. L. *Enamel Laboratory Manual*. Garrard Press, Champaign, Ill., 1941, 64 p.

Crewdson, F. M. *Spray Painting, Industrial and Commercial*. F. J. Drake & Co., Chicago, 1941, 128 p.

Garfunkel, S. L. and Berdnikov, M. I. *Theory and Practice of Metal-Spraying Processes*. (In Russian.) Gismestprom, Moscow, 1940, 208 p.

Hansen, J. E., ed. *A Manual of Porcelain Enameling*. Enamelist Publishing Co. (for the Ferro Enamel Corporation), Cleveland, 1937, 513 p.

Krause, Hugo. *Metal Coloring and Finishing*. Translated from 2nd rev. ed. Chemical Publishing Co., New York, 1938, 222 p.

McClelland, E. H., comp. *Enamel Bibliography and Abstracts, 1928 to 1939, Inclusive*. American Ceramic Society, Inc., Columbus, Ohio, 1944, 352 p.

Schutz, Edwin. *Die Emaillierung des Gusseisens*. Wilhelm Knapp, Halle a. d. S., 1939, 150 p.

Turner, T. H. and Budgen, N. G. *Metal Spraying*. Ed. 2, rev. and largely rewritten by E. C. Rollason. J. B. Lippincott & Co., London, 1939, 235 p.

Wein, Samuel. *Metallizing Non-Conductors*. Metal Industry Publishing Co., New York, 1945, 62 p.

Zytner, A. Ya. and Lapin, N. P. *Treatment of Metals and Electrochemical Coloring*. (In Russian.) Mashgiz, Moscow, 1940, 100 p.

(c) Other Surface Treatments

Jacquet, P. A. *Le polissage électrolytique des surfaces métalliques et ses applications*. v. 1, Aluminium, magnésium, alliages légers. Editions Métaux, Paris, 1946, 340 p.

Krause, Hugo. *Phosphatverfahren zum Oberflächenschutz der Metalle*. Eugen G. Leuze, Leipzig, 1940, 60 p.

(To Be Continued)



new inhibitor for bright pickling

• Now available for the first time is a new type of liquid pickling inhibitor — **ENTHONE INHIBITOR 9**. This new product completely inhibits most non-oxidizing acids — sulphuric, hydrochloric, hydrofluoric and phosphoric. Scale is beautifully and completely removed from steel wire, sheets, rods and finished work, leaving them clean and bright.

Inhibitor 9 is clean and has no odor. It dissolves easily, stops fuming, lowers surface tension for better wetting and displacement of oil films. It is free-rinsing and saves acid by 20% less drag-out plus 99% less attack on steel. *It has every feature required for a perfect inhibitor.*

Would you like a sample to prove these claims for yourself? If so, write today.

**METAL FINISHING
CHEMICALS**

442 Elm Street

New Haven, Conn.

(47) AUGUST, 1948

American Machinist, v. 92, July 1, 1948, p. 77-81.

Unique production-line methods including forming, swaging, soldering, and materials handling.

21a-105. Tubes Keep Ball Bearing Clean. A. M. Murray. *American Machinist*, v. 92, July 1, 1948, p. 102.

Vending-machine technique speeds assembly and insures clean bearings. Air plunger pushes ball bearings from closed tube directly into the hand of the assembler.

21a-106. Special Buffing Machines and Fixtures Reduce Plating Shop Costs. Earl Moore. *Iron Age*, v. 162, July 8, 1948, p. 80-85.

Semiautomatic machines for plating of zinc diecastings for automotive parts and plumbing fixtures.

21a-107. Fixture Locates Rotor Assemblies. W. C. Henderson. *American Machinist*, v. 92, July 15, 1948, p. 119.

Fixture to facilitate assembly of induction-motor cores to their shafts by shrinking, requires accurate positioning of both parts while the cores are cooling.

21a-108. The Tool Engineering Department—Its Organization and Function. Frank S. Dobric. *Iron Age*, v. 162, July 15, 1948, p. 72-79.

How Reliance Electric & Engineering Co. has organized its tool-engineering department to obtain the most effective use of its facilities. Specific examples of how this department has handled various projects.

21b—Ferrous

21b-53. Hollow Blades for Axial Flow Compressor. Russell Meredith and A. J. Phelan. *Metal Progress*, v. 53, June 1948, p. 841-847.

Development of satisfactory manufacturing methods for hollow blades. Since usual methods would not work, it was concluded that hollow blades fabricated from sheet metal formed in steel dies and arc welded would fulfill the requirements of precision, light weight, and mass-production potentialities. A 12%-Cr, 0.15%-C stainless steel was chosen. Layout, forming, welding, inspection, and testing.

21b-54. Making Summer Cooler. Gordon B. Ashmead. *Western Machinery and Steel World*, v. 39, June 1948, p. 90-93, 117.

Forming, welding, and assembly in manufacture of air-conditioning equipment.

21b-55. Lincoln-Mercury Comes to California. *Western Machinery and Steel World*, v. 39, June 1948, p. 98-102.

Fabrication, assembly, and finishing procedures and equipment.

21b-56. Stainless Steel in Novel Product. Paul Graham. *Western Machinery and Steel World*, v. 39, June 1948, p. 103-105.

Fruit and vegetable reamer for household use.

21b-57. Bolt and Nut Specialties Produced in Western Plants. Frank J. Anderson. *Western Metals*, v. 6, June 1948, p. 26-27.

21b-58. Assembly-Line Machining Used to Produce Rock Bits for Petroleum Industry. Gerald Eldridge Stedman. *Steel*, v. 123, July 5, 1948, p. 91-92, 116.

Improved forging practice and die design reduce scrap costs and increase die life. Modern handling methods and specialized holding fixtures.

21b-59. All Steel Burial Caskets. J. R. Barefoot. *Iron Age*, v. 162, July 8, 1948, p. 72-77.

Mass production methods.

21b-60. Straight-Line Production Techniques Utilized for Processing Small

Job Lots. *Steel*, v. 123, July 19, 1948, p. 94-98.

Fabrication methods used in the manufacture of steel exciter-end brackets for d.c. welding sets. Savings are made in both direct and indirect costs even though the normal production run is only 200 units. Procedures are forming, welding, grinding, machining, and drilling.

21b-61. Making a Mining Drill. L. Sanderson. *Mine & Quarry Engineering*, v. 14, July 1948, p. 217-219.

Selection of steel and fabrication procedures.

21d—Light Metals

21d-8. A New Industry for the West Coast: Making Collapsible Tubes. *Western Metals*, v. 6, June, 1948, p. 30-31.

Production of Al tubes.

21d-9. Installing Test Sections of Aluminum Pipe. F. E. Miller. *World Oil*, v. 128, July 1948, sec. 1, p. 186-188, 190.

Special handling and welding techniques for pipe which is being used for oil in areas of high corrosion losses.



JOINING and FLAME CUTTING

22a—General

22a-139. Decreased Purity of Oxygen Results in Loss of Efficiency. (In Russian.) A. D. Akimenko and Kh. I. Evdokimchik. *Promyshlennaya Energetika* (Industrial Power), v. 5, Feb. 1948, p. 12-13.

A comparative study of the use of 99 and 98% oxygen, respectively, in welding, showed that the former is more advantageous, both on a technical and on an economic basis.

22a-140. Powder Weld. Powder Weld Co., (Brooklyn, N. Y.) 1947, 21 pages.

New method of welding, brazing, or surfacing using widely varying compositions of powdered materials.

22a-141. Automatic Welding Speeds Pipe Line Work. G. L. Revell and C. G. Herbruck. *Petroleum Engineer*, v. 19, June 1948, p. 78, 80.

Use of fixtures designed to use with "Lincolnweld" equipment and the hidden-arc, automatic, deep-flux welding.

22a-142. Welding Research. Comfort A. Adams and William Spraragen. *Metal Progress*, v. 53, June 1948, p. 811-816.

Work of the Welding Research Council of the American Welding Society, outlining progress made, present projects, and future plans.

22a-143. Some Considerations in Hard Surfacing. David B. Rankin. *Iron Age*, v. 161, June 17, 1948, p. 91-93.

Economic and technological considerations.

22a-144. Steel Fabricator Shifts to A.C. Welding. Frank Wendel. *Iron Age*, v.

161, June 24, 1948, p. 88-89.

Considerable savings were obtained by elimination of arc blow, lower power and maintenance costs, and ability to use larger electrodes.

22a-145. Fundamental Factors Influencing the Weldability of A.W.S. Type E 6020 Arc Welding Electrodes. Boyd E. Cass. *Footprints*, v. 20, no. 1, p. 14-21.

A test method and test results in an investigation to obtain data confirming the contention that the oxygen content of an E 6020-type electrode coating is a primary factor influencing operational and weld-deposit characteristics, to show that the amount of manganese in the coating plays a very important part in determining electrode characteristics, and to show that oxygen content and amount of manganese in the coating are interdependent functions that must be correlated to yield satisfactory coating formulations.

22a-146. Better Silver Brazing Methods Improve Refrigeration Equipment. A. W. Swift. *Refrigerating Engineering*, v. 55, June 1948, p. 556-559.

Recommended methods.

22a-147. A Chronicle of Arc Welding. Gilbert S. Schaller. *Western Metals*, v. 6, June, 1948, p. 32-35.

History and present day problems.

22a-148. About Torch Flames. Victor Weld, v. 4, June 1948, p. 10-13.

Their chemistry; their temperatures; and their usefulness in the welding industry.

22a-149. Causes and Remedies for Common Troubles With Spotwelding Machines. *Factory Management and Maintenance*, v. 106, July 1948, p. 134, 136.

22a-150. For More Efficient Production Check Your Maintenance Welding. Frank J. Gaydos. *Industry and Welding*, v. 21, July 1948, p. 26-30, 76-77.

Intelligent planning of work, preventive-maintenance practices, hard surfacing applications, and plate-fabrication procedures.

22a-151. Welding Dissimilar Metals With Stainless Electrodes. Anton L. Schaeffler. *Iron Age*, v. 162, July 1, 1948, p. 72-79.

A graphical method that makes possible the prediction of weld-metal composition and structure; the joining of dissimilar metals utilizing single deposits and multipass welds.

22a-152. Bonding Aluminum to Ferrous Metals. M. G. Whitfield and V. Sheshunoff. *Iron Age*, v. 162, July 1, 1948, p. 88-93.

Processing techniques and design factors involved in accomplishing the above by casting operations. A method of assembly in which aluminum sheet is brazed to steel or cast-iron parts. Typical applications.

22a-153. Functionalized Electronic Controls for Resistance Welding. W. E. Large. *Iron Age*, v. 162, July 8, 1948, p. 90-94.

Use of eight main and six supplementary assemblies which will allow numerous combinations for sequencing and weld timing.

22a-154. Cold Welding; Technique and Application. *Welding*, v. 16, June 1948, p. 260-262, 267.

New process of welding without heat. Surface preparation, suitable materials, weld strength, and welding methods.

22a-155. Resistance Welding in Mass Production; Control Equipment for Resistance Welders. A. J. Hipperson (Turn to page 50)

Metallurgist Cooperates With Diverse Technicians in Television Tube Industry

Reported by A. J. Kleiner
Foreman, Hamilton Watch Co.

The need for many diverse technical skills in such a highly specialized industry as the manufacture of television tubes was strikingly portrayed by Arnold S. Rose, metallurgist of the RCA Victor Division electron tube plant at Lancaster, Pa. Mr. Rose addressed the annual May meeting of the York Chapter A.S.M., held at Gettysburg College. His subject was "The Metallurgist and Industry".

The meeting also featured an afternoon plant visitation to the Induction Equipment Corp., where the chapter members witnessed the drawing and enameling of fine copper wire, winding of coils, assembly of small transformers and oil burner ignition units, and the manufacture of large industrial transformers. An opportunity was also provided during the afternoon to visit the historic Gettysburg battleground.

A unique feature of Mr. Rose's evening presentation was the utilization of a sound motion picture short and of a wire-recorded sequence to implement his talk.

The cooperative efforts of the metallurgist with other groups, such as chemical engineers, analysts, ceramists, glass technologists and physicists are required to serve the technical needs of modern industry, Mr. Rose pointed out.

Among specific examples of this collaboration, he described the use of an 18-12 type of stainless steel in place of the common 18-8 variety for component parts of television tubes which must remain nonmagnetic

in face of the cold working they receive during tube manufacture. With the assistance of the physicists, an inexpensive, simply constructed permeator was designed and assembled to measure permeability in the range up to 1.01. Other nonmagnetic materials described included Nichrome V, Inconel, Hastelloy B, and K-monel.

The fascinating field of vacuum-tight glass-to-metal seals was outlined in similar vein, when Mr. Rose highlighted the manner in which the glass technologist and metallurgist work together to provide both glasses and alloys with suitable properties. The instruments of measurement—the thermal expansion dilatometer and the polariscope for measuring strain in seals—were illustrated, along with several vivid color slides of typical strain patterns.

Most interesting among the several other examples cited was the reproduction by a wire recording of the sound of a Geiger-Muller counter in actual operation. The instrument was used to distinguish between filament wires of tungsten and thoriated tungsten—a differentiation made possible by the increased radioactivity of the wires containing thorium oxide.

S. A. E. Shot-Peening Div. Holds Technical Sessions

Members of Division XX on Shot-Peening of the Society of Automotive Engineers, Iron & Steel Technical Committee, were guests of the American Wheelabrator & Equipment Corp., Mishawaka, Ind., on June 17 and 18 for a two-day technical session. Various phases of the technique and mechanics of shot-peening to increase the fatigue life of metal parts were discussed.

R. L. Mattson of General Motors Research Laboratories presided at the meeting, and the speakers included John C. Straub, chief research engineer of American Wheelabrator & Equipment Corp.; F. P. Zimmerli, chief engineer of Barnes-Gibson-Raymond Div.; N. S. Mosher of Chevrolet Motor Div.; and Roy Steele of Eaton Mfg. Co. A plant inspection of American Wheelabrator & Equipment Corp. was also held.

New Steel Warehouse Opened

The opening of a large, modern steel warehouse and facilities in San Francisco has been announced by United States Steel Supply Co., warehousing subsidiary of United States Steel Corp. The new warehouse is the company's eleventh, and occupies a square block with an area of 260,016 sq. ft. Frank B. Stewart is the local plant manager.

Becomes Representative in Texas for Valve Company

C. F. Johnson has recently resigned from Watson-Stillman Co., Roselle, N. J., and joined Manning, Maxwell



C. F. Johnson

& Moore, Inc., manufacturers of valves and instruments. Mr. Johnson will function as special representative in Houston, Texas, where he will contact all phases of the oil industry.

After receiving his B.S. degree in Mechanical Engineering at Rice Institute in Houston, Mr. Johnson joined the Reed Roller Bit Co. of that city and later became manager of the valve division. In 1943 he accepted a similar position with Security Engineering Co. of Whittier, Calif., and later became chief engineer of the distributor products divisions of Watson-Stillman Co.

Ball and Roller Bearing Uses Are on Increase Jameson Tells Wichita

Reported by Lynn Hibbs
The Coleman Co.

The use of ball and roller bearings is on the increase, A. S. Jameson, assistant manager of metallurgy for International Harvester Co. of Chicago, told the Wichita Chapter A.S.M. on May 20. His subject was "Metallurgy of Ball and Roller Bearing Manufacture".

Ball bearings are through hardened and roller bearings are casehardened, he said. More and more tubing is being used for the rings of bearings because it is cheaper and makes a high quality bearing.

Upset forgings are being used, especially on larger bearings. The effect of carbide distribution attained by different heat treatments was illustrated and discussed.

Mr. Jameson showed pictures of the various types of heat treating equipment. The continuous, atmosphere-controlled furnace is gaining rapidly in usage, especially on the small and medium size bearings. On larger bearings, where warpage is a factor, the martempering process is used, and reduces grinding costs.

Other subjects discussed were methods of making balls, testing for crushing strength of balls, and accelerated testing of finished bearings at three times normal load rating.

Welders Should Learn Fundamentals of S-Curves

Reported by Clyde R. St. John
Senior Metallurgist Permanente Metals Corp.

Robert R. Miles, president of Allied Weldery, Inc., Coeur d'Alene, Idaho, emphasized the need for teaching the average welder a few fundamentals, in a talk before the May meeting of the Inland Empire Chapter A. S. M. These fundamentals concern the effects of heating and cooling rates to obtain the correct microstructure.

If a welder understands the effect of cooling rates he can, by study of the S-curves and the equilibrium diagram, determine the size of electrode needed, the amperage, rate of travel and the preheat which should be applied. By photomicrographs Mr. Miles demonstrated the effect of heating and cooling rates on the areas adjacent to welds made by different methods.

See Page 61 for

Metal Congress Hotel Reservations

and T. Watson. *Welding*, v. 16, June 1948, p. 263-267. (To be continued.)

22a-156. Research Progress; a Critical Survey. *Welding*, v. 16, June 1948, p. 269-271.

Reviews eight recent papers on various topics related to welding.

22a-157. Welding and Low-Temperature Brazing of Air Conditioning and Refrigeration Parts. Ward Swarthout. *Welding Journal*, v. 27, July 1948, p. 511-516.

Typical products which can be fabricated satisfactorily by the oxy-acetylene method. Techniques used in making heat pumps and other air-conditioning and refrigeration equipment.

22a-158. Overheating of Electrodes. I. L. Stern. *Welding Journal*, v. 27, July 1948, p. 522-526.

Method for investigating the tendency of electrodes to overheat during operation. Several bad effects which may result from overheating. Application of the method to a specific problem.

22a-159. Manual Use of Hidden-Arc Welding Reduces Welding Time on U68 Code Work by 42%. Emmett A. Smith. *Welding Journal*, v. 27, July 1948, p. 536-538.

Application of the above as a production tool in manufacture of refinery equipment.

22a-160. Penetration and Travel Speed in Metal-Arc Welding. R. Gunnert. *Welding Journal*, v. 27, July 1948, p. 542.

Results of tests to determine validity of penetration formulas developed for Unionmelt welding.

22a-161. Technical Progress Report of the Ship Structure Committee. *Welding Journal*, v. 27, July 1948, p. 377s-384s.

A sequel to the Final Report of the Ship Structure Committee's predecessor, "The Board to Investigate the Design and Methods of Construction of Welded Steel Merchant Vessels." Summarizes findings on design, material, methods of fabrication, and structural failures of steel merchant vessels. 53 ref.

22a-162. Plastic Bonding for Composite Wood and Metal Structures. Charles J. Moss. *Plastics* (London), v. 12, June 1948, p. 304-311.

With the development of the Redux process, rational wood and metal structures became possible for the first time. Various examples of Redux bonding.

22a-163. Nomenclature and Applications of Welding Electrodes. F. W. Myers. *Tool Engineer*, v. 21, July 1948, p. 29-33.

Selection of welding rods for various applications.

22a-164. Welding Dissimilar Metals; Basic Principles of This Important Production Technique Are Outlined. D. R. Kananof. *Petroleum Refiner*, v. 27, July 1948, p. 135.

22a-165. A.C.F.'s Welded Hopper-Car Assembly Line. *Railway Age*, v. 125, July 17, 1948, p. 32-33.

Application of various welding techniques to the construction of 70-ton hopper cars by American Car & Foundry Co., Huntington, W. Va.

22b—Ferrous

22b-196. Electric Furnace Brazing Facilitates Manufacture of Insecticide Bombs. *Industrial Heating*, v. 15, June 1948, p. 942, 944, 946, 962.

22b-197. Simple Spot Welding Equipment Assembles Bath Tubs. *Steel Processing*, v. 34, June 1948, p. 304-305.

22b-198. Flame Cutting of Stainless Steel. R. Groves. *Machinery Lloyd*, (Overseas Edition), v. 20, June 5, 1948, p. 68-71.

Use of flux-injection method.

22b-199. New Machine Eliminates Stainless Flange Welds. Harry Frankfort. *Chemical Industries*, v. 62, May 1948, p. 752-753.

New process known as "cold Vans-toning" and the machine developed to form joints by rolling the end of the tubing to the proper form. It makes possible lightwall stainless-steel piping systems without welds and eliminates fire hazards and costly shutdowns during installation and replacement.

22b-200. Making the Most of Oxygen Cutting. C. G. Bainbridge. *Engineers' Digest* (American Edition), v. 5, May-June, 1948, p. 165-168, Condensed from *Iron and Coal Trades Review*, v. 166, Jan. 30, 1948, p. 205-211.

Oxygen consumption, nozzle size, cutting speed, fuel gases, cost of cutting, reducing cutting costs, and accuracy of cutting.

22b-201. Playboy Preview. Walter Rudolph. *Welding Engineer*, v. 33, July 1948, p. 38-39.

Fabrication of all-welded automobile.

22b-202. Manual "Hidden-Arc" Process. J. S. McKeighan. *Welding Engineer*, v. 33, July 1948, p. 40, 43.

New semiautomatic welding method reduces the cost of both longitudinal and circumferential welds in glass-lined chemical reactors.

22b-203. Pressure-Welded Aircraft. Fred M. Burt. *Welding Engineer*, v. 33, July 1948, p. 44-47.

Development of the process for production of medium-carbon, low-alloy-steel, tubular aircraft members.

22b-204. Cages for Concrete Reinforcement. Herbert Leopold. *Welding Engineer*, v. 33, July 1948, p. 52-53.

Fabrication of cage-like reinforcement for construction of concrete pipe of high bursting strength, on an Australian welding machine. An ingenious combination of spot and seam welding is used to produce about 200 welds per minute, or about 5 ft. of cage length.

22b-205. Permissible Loads for Fillet Welds Per Inch of Length. Leo Berner. *Welding Engineer*, v. 33, July 1948, p. 67.

22b-206. Investigation Into Spacing of Spotwelds. H. Dudley Wimer, Jr. *Aero Digest*, v. 57, July 1948, p. 66-67, 117-118, 120.

The problem of correct spacing of spot welds in stainless steel. Standards have been setup, but nonstandard practices in the form of larger or more closely spaced welds are common where strength is most important. "Special Weld Spacing Chart" developed from a mathematical consideration of a proximity effect and from results of a number of laboratory tests.

22b-207. Precision Welding Jigs Simplify Stove Assembly. Walter Rudolph. *American Machinist*, v. 92, July 1, 1948, p. 82-84.

22b-208. Manual Hidden Arc Welds Hoist Cylinders 300% Faster. Al Blewett. *American Machinist*, v. 92, July 1, 1948, p. 106-107.

Replaces conventional hand welding with manual hidden-arc welding. Improvement in weld quality eliminated leaks caused by porosity and facilitated subsequent machining.

22b-209. Tool Construction and Maintenance by Welding. E. H. Girardot. *Steel*, v. 123, July 5, 1948, p. 80-82, 84.

Manhours, materials, and production delays can be saved by proper application of different types of welding in making and repairing tools, dies, and fixtures.

22b-210. Manual Hidden Arc Welding Cuts Welding Time by 65 Pct. E. A.

Hess. *Iron Age*, v. 162, July 8, 1948, p. 78-79.

Procedure utilizing extremely high current densities in order to reduce welding time on frame girders. Edge preparation is reduced or eliminated and weld quality is reported to be excellent.

22b-211. Butt Welded Chains; Details of Specialized Equipment and Methods. *Welding*, v. 16, June 1948, p. 230-235, 248.

Methods and equipment used by British firm, including use of photoelectric cells for the control of welding temperature. Heat treatment and testing of the chains.

22b-212. Some Essentials in Oxy-Acetylene Pipeline Welding. E. Fuchs. *Welding*, v. 16, June 1948, p. 236-248.

Preparation of pipes of varying diameters for welding. Methods of matching, alignment, and clamping; attachment of branches.

22b-213. Major Operations on Oil Tankers; Repairs to a Severely Damaged Ship. (Continued.) J. K. Johansen. *Welding*, v. 16, June 1948, p. 249-259.

Large-scale welding repairs to damaged tankers. Numerous diagrams.

22b-214. The Weldability of Steels, and a New Weld-Cracking Test. P. L. J. Leder. *Engineering*, June 11, 1948, p. 573-575; June 18, 1948, p. 582-583. A condensation.

Concerned with cracking in the heat-affected area of the parent plate immediately adjacent to the weld, and primarily with the weldability of high-tensile steels. Various types of weld-cracking tests. A new test of the tied butt weld type measures the stress across the weld directly, instead of measuring stresses arising out of thermal expansion and contraction of the test plates. Results obtained with various types of welding electrodes containing different amounts of hydrogen in the coating.

22b-215. Some Modern Developments in Steels for Welded Structures. W. Barr. *Metallurgia*, v. 38, June 1948, p. 79-84.

Weld hardening, weld cracking, and mechanical properties of welds in different steels. Welding armor plate; the phenomenon of brittle fracture which caused failure of several American welded ships.

22b-216. British Welding Research Association. *Engineer*, v. 185, June 18, 1948, p. 589-590.

New research facilities.

22b-217. Automatic Welding of Steel Mill Equipment. W. W. Scherer and H. J. Ralston. *Iron Age*, v. 162, July 15, 1948, p. 80-88.

Building up worn surfaces and repairing broken parts at Carnegie-Illinois Steel Corp., Munhall, Pa.

22b-218. A New High-Strength Welding Rod. Lester Tarnopol. *Welding Journal*, v. 27, July 1948, p. 517-521.

Research leading to development of a satisfactory rod for arc welding of aircraft landing-gear assemblies. Macrostructure and microstructure. Tensile, hardness, and spectrographic analysis charts for Planeweld AWF 144-4130 rod.

22b-219. Maintenance Welding in a Steel Plant. Frank J. Geydos. *Welding Journal*, v. 27, July 1948, p. 527-530.

Examples of the above at Gary Works, Carnegie-Illinois Steel Corp.

22b-220. Fabricated Diesel Engine Structures. C. B. M. Dale. *Welding Journal*, v. 27, July 1948, p. 531-535.

Redesign of a cast-iron diesel engine with a complete interchange of parts with either castings or welded steel parts.

(Turn to page 52)

Over-All Cost Is Deciding Factor in Material Selection

Reported by L. Wiley Cooper
Iowa State College

"Over-all cost is usually the deciding factor in the selection of materials," according to H. Bornstein, director of testing and research laboratories, Deere and Co., Moline, Ill. He spoke before some 150 members and guests who attended a joint meeting of the Central Iowa Section of A.S.M.E. and the Des Moines Chapter A.S.M. His topic was "Engineering Materials and Their Application". Mr. Bornstein touched briefly on the application of nonmetals, light metals and other nonferrous metals, but devoted the major part of his talk to ferrous metals.

The question of material selection arises whenever new design, service failures, cost reduction, and substitution problems are encountered. The speaker called attention to the value of the stress engineer and the metallurgist in the development of new designs.

When service failures occur, it is

cheaper and better to change the design than to attempt to correct poor design by using expensive materials and treatments. Although considerable progress has been made in eliminating sharp corners, it is still necessary to call attention to high stress concentrations.

The designer should know what properties are required and he should be familiar with progress in materials and treatments. Frequently properties are specified because they are available in a certain material. Some of these properties may not be necessary, and so another and perhaps cheaper material might well be used.

Mr. Bornstein discussed recent developments in steel specifications and the use of hardenability charts. The farm machinery industry, he said, has become a large user of the new H-steels, which were developed jointly by the S.A.E. and the A.I.S.I. The

H-steels provide a narrower range of hardenability although the chemistry limits are somewhat wider.

The speaker described the development of cast iron specifications and the trend toward better control in the foundry. Use of pearlitic malleable is increasing rapidly, he pointed out, because of its higher strength properties and greater wear resistance as compared to regular malleable iron.

See Page 61 for
Metal Congress Hotel Reservations

Foundrymen Change Name

American Foundrymen's Association, 52-year-old technical organization of the castings industry, has voted to change its name to American Foundrymen's Society. The change was adopted by the membership in a general revision of bylaws, on July 1.

According to Secretary-Treasurer William W. Maloney, the new name is more descriptive of the organization's functions, since the term "society" is generally applied to an organization that has such specific aims as the Foundrymen—namely, to advance the arts and sciences relating to the manufacture and utilization of metal castings.

FOR SALE

HOSKINS TYPE FR-252 BOX ELECTRIC FURNACE. 3 phase, 220 volts, 26 KW rating, firing chamber 34" long x 20" wide x 13" high. Accessory equipment includes Hoskins pyrometer—range 0 to 2000 degrees F; Kuhlman transformer 30 KVA 440 to 220; signal lights. Excellent condition; Price \$1200. F.O.B. J. A. Dedouch Co., Inc., 608 Harrison St., Oak Park, Ill.

AMAZING PERFORMANCE
RECORD CAN NOW
BE TOLD!



Trade Mark Reg.

FASTEST FLOWING . . . CLEANEST WORKING
• HARD SOLDERING FLUX

Now it can be told how KWIKFLUX time-saving and cost-cutting qualities speeded production of essential war items: Bazookas, Mortar Shells, Tail Fins, Rifle Grenades, M69-M74 Bombs, Aeroplane Intake Manifolds, Aerosol Bombs, Burstur Tubes, and scores of other products. KWIKFLUX meets all rigid standards and specifications.

DOUBLE PENETRATION POWER!

The double penetration power of KWIKFLUX speeds production of all types of items in the following metals: Stainless Steel, Iron, Steel, Copper, Brass, Gold, Platinum, Silver, Monel Metal, Nickel, Nickel Silver and other ferrous and non-ferrous metals and alloys. Works perfectly with direct flame, gas hydrogen, acetylene and muffle (direct and indirect) and induction heating.

WRITE FOR FREE SAMPLE

See for yourself the cost-cutting and work-improving qualities of KWIKFLUX. Send for free sample jar—mention type of work for which it is to be used. Write today!



SPECIAL CHEMICALS CORP.

Dept. MR

30 Irving Place • New York 3, N. Y.



SURFACE
TREATING
CHEMICALS

PROTECT
METALS

There are ACP Chemicals that—

- Remove rust, oil, grease and other surface soil.
- Provide a bond for firm and durable finish adhesion.
- Prevent rust during storage and transit.
- Inhibit pickling acids and improve complete pickling operations.

Send for Bulletin P-100-21 on ACP surface-treating chemicals, and metal protective service. Dept. Met-1.

AMERICAN ACP CHEMICAL PAINT CO.
AMBLER, PENNSYLVANIA

22b-221. **Getting Ready to Weld.** H. B. Gilson. *Welding Journal*, v. 27, July 1948, p. 539-541.

Edge-preparation steps such as cleaning the metal edges, making allowances for expansion and contraction, and lining up the adjoining pieces.

22b-222. **Heliarc Welding of Stainless Steel Tanks.** *Welding Journal*, v. 27, July 1948, p. 564.

Application of the inert-gas shielded-arc welding process.

22b-223. **Research on Arc Welded Butt Joints of Mild Steel.** Georges Welter. *Welding Journal*, v. 27, July 1948, p. 321s-369s.

An investigation at room and sub-zero temperatures on: ductility; impact-tensile resistance; and effect of notching using cyclic loads and axial and eccentric loads.

22b-224. **State of Stress in Arc Welds Made Under Transverse Restraint.** Ernest F. Nippes and Warren F. Savage. *Welding Journal*, v. 27, July 1948, p. 370s-376s.

The conditions of restraint are just below the values which would produce longitudinal cracking in the first-pass weld metal. The state of stress resulting from these conditions of restraint is designated as the threshold of cracking. A number of comparisons are made to indicate the significance of plate thickness, joint geometry, and type of electrode.

22b-225. **The Powder Process in Stainless Steel Production.** C. J. Burch and E. M. Holub. *Iron and Steel Engineer*, v. 25, July 1948, p. 43-51; discussion, 51-52.

Use of metallic powders for cutting and scarfing a large variety of alloy compositions at any stage from the ingot to the finished product.

22b-226. **Resistance Welding in the Steel Industry.** O. H. Griffith. *Iron and Steel Engineer*, v. 25, July 1948, p. 58-61; discussion, p. 61.

Various types of equipment and their applications.

22b-227. **24,000 Spot Welds Per Hour.** *Machine Design*, v. 20, July 1948, p. 148-149.

Designed to spot weld automatically scooter-wheel halves together, multiple-head welder combines electrical, hydraulic, and pneumatic power and control.

22b-228. **Arc Welding Shrinks Prop Hub Cost, Weight.** *SAE Journal*, v. 56, July 1948, p. 33-39. Excerpts from *Arc Welded Propeller Hubs Reduce Cost—Weight*, by John D. Waugh.

Redesigning propeller hubs for arc welding instead of forgings saves steel, lowers production costs, and reduces weight. How to design for welding and the production-welding technique for fabricating these hubs.

22b-229. **Butt Welded Rail in Australia.** *American Railway Engineering Association, Bulletin*, v. 50, June-July 1948, p. 52-56.

Above practice has been applied to nearly 1400 miles of track and is being rapidly extended. Methods are outlined.

22b-230. **Welded Locomotive Trucks.** F. H. Brehob and W. H. Cochran. *Railway Mechanical Engineer*, v. 122, July 1948, p. 73-74.

Experience with the above; procedures of design and manufacture.

22c—Nonferrous

22c-13. **Arc Welding Red Brass.** Louis P. Benua. *Iron Age*, v. 161, June 17, 1948, p. 77-79.

Certain difficulties arose from the fact that components oxidize at high temperatures. By using auto-

matic helium-shielded carbon-arc welding, rejections were reduced 75% and the burst strength of the tank was doubled.

22c-14. **The Cold Welding of Metals.** *Engineering*, v. 165, June 4, 1948, p. 535.

Not only aluminum and Al alloys, but also various other metals, can be joined at room temperature by applying pressure by means of specially designed dies, provided the metal is given a suitable preliminary surface treatment. Best joints are obtained with Al and its alloys and with Cu. Dissimilar-metal joints of Al and Cu have also been made.

22c-15. **Cold Welding.** *Engineer*, v. 185, June 4, 1948, p. 541-542.

See abstract from *Engineering*, v. 165, June 4, 1948, item 22c-14.

22c-16. **Copper Tanks Welded by Inert Arc.** S. V. Jewell. *Welding Engineer*, v. 33, July 1948, p. 33-37.

Fabrication of four large copper tanks believed to be the first instance of application of the inert-arc process to large vessels of nearly pure copper. Among the problems encountered and solved were those imposed by space limitations, dirty surroundings, and high humidity.

22d—Light Metals

22d-37. **Developments in "Cold Welding".** *Machinery*, (London), v. 72, May 27, 1948, p. 648-650.

Pressure joining of Al and its alloys at room temperature.

22d-38. **Economical Joining of Magnesium Possible Through New Brazing Method.** Paul Klain. *Materials & Methods*, v. 27, June 1948, p. 83-87. Method developed by Dow.

22d-39. **Bonding Rubber to Metal Assemblies.** C. H. Mahoney. *Modern Metals*, v. 4, June 1948, p. 22-23.

Methods used in manufacture of aluminum fuel tanks for outboard motors.

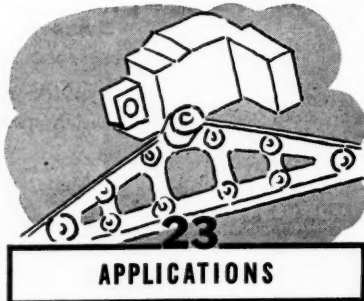
22d-40. **Welding the Light Alloys. Part III. Light Metals.** v. 11, June, 1948, p. 337-344.

Flame brazing process for joining aluminum sheet, plate and sections.

22d-41. **Heliarc Welding of Aluminum Frames for Coin-Operated Phonographs.** *Machinery*, v. 54, July 1948, p. 170-171.

For additional annotations indexed in other sections, see:

11-189; 15b-40; 19a-136; 20a-273; 21b-53-54; 23b-35; 24b-74; 27a-95.



APPLICATIONS

23a—General

23a-31. **High-Temperature Alloys; Some Aspects Associated With Their Development for the Gas Turbine.** A. Dunlop. *Metal Industry*, v. 72, May 28, 1948, p. 437-439; June 4, 1948, p. 457-459.

Trend of development in the U. S., England, and Germany. Compara-

tive creep and fatigue properties. 14 ref.

23a-32. **Materials at Work. Materials & Methods.** v. 27, June 1948, p. 90-92.

Impregnated fabric cutoff wheel for use in cleaning and snagging operations on both ferrous and non-ferrous casting; plastic lens for photo-electric light meter; Cu-Ni-Co magnets replace jewel bearings; aluminum pipe line for "sour" crude; abrasion resistant rubber for shot-blast rooms; music from super-tensile steel wire having a tensile strength of approximately 400,000 psi.; and plastic auto top.

23a-33. **Substitute Materials for Overhead Wires for Tramway and Trolleybus Services.** L. Albert. *Engineers' Digest* (American Edition), v. 5, May-June, 1948, p. 193-194. Translated and condensed from *Revue de l'Aluminium*, v. 25, Jan., 1948, p. 3-12.

Previously abstracted from original source. See item 23d-50, 1948.

23a-34. **How to Choose the Best Alloy for Your Die Castings.** Herbert Chase. *Electrical Manufacturing*, v. 42, July 1948, p. 102-107, 160, 162, 164.

Compositions, properties and typical applications.

23a-35. **Preplanning Turnarounds, Use of Alloys Shorten Downtime, Extend Onstream Periods for Operating Distillation Equipment.** Arch L. Foster. *Oil and Gas Journal*, v. 47, July 1, 1948, p. 72-73, 76.

Procedures and selection of alloys for different jobs at refineries.

23a-36. **New Metals for Old.** Edward Appleton. *Proceedings of the Institute of British Foundrymen*, v. 40, 1946-1947, p. A20-A29.

10th Edward Williams Lecture. Progress in metal development, applications to manufacture of new items, and ways in which scientific inquiry and experimental measurements have led to discovery of better metals for practical use.

23b—Ferrous

23b-33. **Ferro Fundido Para Moldes De Vidro.** (Cast Iron as a Material for Glass Molds.) Lino Alfonso de Lacerda Santos. *Boletim da Associacao Brasileira de Metais*, v. 4, April 1948, p. 177-185.

Possibility of utilization of cast iron as material for glass molds. Influence of composition of the cast iron on the finished product.

23b-34. **Stainless Steel Exhibit.** *Welding Journal*, v. 27, July 1948, p. 562-564.

Applications and economics of the stainless steel industry.

23b-35. **Welded Stainless Steel Plant.** H. Seymour. *Petroleum*, v. 11, July 1948, p. 157-158.

Corrosion resistance vs. various chemicals commonly encountered in chemical-plant equipment; important applications of 18-8; classification of stainless steels; welding requirements.

23b-36. **Bearing Metals; Cast Iron as Anti-Friction Material.** *Automobile Engineer*, v. 38, June 1948, p. 210. Based on recent report by M. S. Karpyshev in *Vestnik Mashinostroeniya* (U.S.S.R.).

It has been believed that cast iron can only be used under pressures of 285 psi., and at rubbing speeds less than 6½ ft. per sec., under shock-free conditions. Recent Russian research indicates that these limits can be exceeded if machining is precise and produces good finishes, and if design and lubrication are satisfactory.

(Turn to page 54)

Merits of Various Flaw Detection Methods Compared

Reported by Frank Kristufek
U. S. Steel Research Laboratory

With the ever-increasing demand for higher quality in finished products, the field of nondestructive testing has advanced in recent years to a new level of importance, according to J. B. Austin, director of the U. S. Steel Research Laboratory at Kearny, N. J., in his talk on "Nondestructive Testing" before the New Jersey Chapter in May.

Formerly, flaw detection in some materials depended on the ear more than the eye. Defects were supposedly discovered by ringing tests conducted by suspending the part and striking it with a metal rod, stated Dr. Austin. The note given off by a sound part would be clear and bell-like. However, the method would not discover minute cracks, and with products of complicated design it might give an entirely erroneous result.

For magnetic steels one of the most widely used tests today is the electromagnetic method, illustrated by the magnaflux and Electroflux machines. The magnaflux method is employed to detect surface seams, grinding or quenching cracks, shrinkage cavities in welds and similar defects. It has the disadvantage that any defect which is not at right angles to the flow of the magnetic flux will not be detected by the small iron particles that arrange themselves on the surface of the part. In the Electroflux method, the defects must be longitudinal to the flow of the current.

Another testing device which employs the magnetic method is the Sperry rail tester, which gives a record of variations in current density in the rail.

Magnetic analysis inspection is used to detect flaws in material as well as to sort out mix-ups in analysis, grades, or processing. In this method, the sample forms the core of a transformer and its various characteristics provide shifts in the phase angle between the current and the voltage of the induced current and alter the relation among the harmonics in the alternating wave current.

With the aid of D. W. Benz of the U. S. Steel Research Laboratory, Dr. Austin demonstrated a magnetic comparison tester used with a standard of known properties. It consists of an alternating current bridge in which the impedance of a coil surrounding the test specimen is balanced either against a standard specimen in a similar coil or against a synthetic standard of equal impedance. This method is usually applied

to the testing of large quantities of similar materials such as bar stock, wire, razor blade stock, and tubing.

A recent innovation is the fluorescent flaw detector or Zyglo method, in which the part is soaked in a fluorescent solution, and the defects shown under an ultraviolet lamp.

Radiography is finding wider application with the development of more powerful equipment, according to Dr. Austin. It has the advantage over other methods of providing a photographic record of inspected material. Furthermore, there are practically no limitations to the shapes and forms of material which can be X-rayed, although the method has largely been restricted in the metal industries to the inspection of cast or welded products.

Supersonic methods have been developed within the last few years to the point where they now rank with other nondestructive testing tools. In the reflection method (or echo principle), sound waves are sent into the part and measurement is taken of the length of time required for these vibrations to penetrate the material, reflect from the opposite side or from an internal flaw, and return to the sending point. In the through-transmission method, the change in energy level of the sound beam when it passes through the material is noted.

The reflection method is best suited

for detecting deep-seated defects which present a reflecting surface to the beam. Penetrations in steel as high as 10 to 15 ft. have been reported, although coarse-grained materials like copper and lead are more difficult to penetrate. With the reflection method, it is possible to locate the defect accurately, and usually the size and depth of defect as well. The transmission method of supersonic inspection is primarily a qualitative method in that it merely detects the existence of flaws.

IMPORTANT MEETINGS for September

Sept. 13-17 — Instrument Society of America. Third Instrument Conference and Exhibit, Convention Hall, Philadelphia. (Richard Rimbach, exhibit manager, I.S.A., 1117 Wolfendale St., Pittsburgh 12, Pa.)

Sept. 25 — American Chemical Society; American Institute of Chemical Engineers; Electrochemical Society. Fourth Annual Cleveland Symposium (on Surface Chemistry), Hotel Carter, Cleveland. (K. S. Wilson, chairman; c/o Harshaw Chemical Co., 1945 East 97th St., Cleveland 6, Ohio.)

Sept. 28-Oct. 1 — Association of Iron and Steel Engineers. Iron and Steel Exposition, Public Auditorium, Cleveland. (A.I.S.E., 1010 Empire Bldg., Pittsburgh 22, Pa.)

HARSHAW ANODES and CHEMICALS

OUR job for more than fifty years has been to concentrate on improving the quality of the anodes and chemicals used by platers. You can depend on Harshaw products to keep your production moving.

NICKEL PLATING . . . nickel anodes—all commercial grades and sizes . . . anode bags . . . nickel salts—single and double . . . nickel chloride . . . nickel carbonate . . . boric acid.

CHROMIUM PLATING . . . pure "Krome Flake" 99.8% CrO_3 . . . sulphates less than .10% . . . lead, tin-lead and antimony-lead anodes.

COPPER PLATING . . . copper ball anodes . . . Rochelle Salts . . . sodium and copper cyanides . . . copper sulfate . . . copper fluoborate.

CADMIUM PLATING . . . ball and cast cadmium anodes . . . cadmium oxide . . . sodium cyanide.

TIN PLATING . . . cast tin anodes . . . sodium stannate . . . stannous sulfate . . . tin fluoborate . . . acid tin addition agent.

ZINC PLATING . . . ball and cast zinc anodes . . . sodium and zinc cyanide . . . zinc sulfate.

LEAD PLATING . . . cast lead anodes . . . lead fluoborate.

SILVER PLATING . . . silver cyanide . . . silver nitrate.

THE **HARSHAW CHEMICAL CO.**
1945 East 97th Street, Cleveland 6, Ohio
BRANCHES IN PRINCIPAL CITIES

23c—Nonferrous

23c-43. On the Up and Up. A. Arditti. *Die Castings*, v. 6, July 1948, p. 28-30, 49-50.

Various parts of small portable hoisting unit being redesigned for maximum use of die-cast aluminum and zinc.

23c-44. All for Fun. *Die Castings*, v. 6, July 1948, p. 35-37.

Construction kit with which a 12-year-old child can build any of four different styles of toy automobiles, using zinc die castings and molded plastic parts.

23c-45. The French Die Casting Industry in 1948. H. K. Barton and L. C. Barton. *Machinery (London)*, v. 72, June 24, 1948, p. 769-772.

Die-cast parts and products exhibited at the 1948 Paris Trade Fair.

23c-46. Alloys for Glass-to-Metal Seals. John H. Crede. *Steel Horizons*, v. 10, no. 3, 1948, p. 14-16.

Properties and applicabilities of alloys made by Allegheny Ludlum Steel Corp.

23d—Light Metals

23d-110. The Slazenger Die Cast Racket Press. H. K. Barton. *Machinery (London)*, v. 72, May 27, 1948, p. 659-662.

Clamping press for tennis rackets made of aluminum. Details of die design.

23d-111. Aluminum Used for 15-Ton Bridge Crane. *Iron Age*, v. 161, June 17, 1948, p. 94.

23d-112. Printing Plates from Seawater? Walter Kubilius. *Bookbinding & Book Production*, v. 46, June 1948, p. 45-48.

Advantages of Mg-alloy plates.

23d-113. Aluminum Jeep Cab. *Modern Metals*, v. 4, June 1948, p. 28.

23d-114. Aluminum for the Dairy Industry. *Modern Metals*, v. 4, June 1948, p. 30-32. Translated and revised from *Revue de l'Aluminium*.

23d-115. Scaffolding in Light Alloy. *Light Metals*, v. 11, June 1948, p. 310-311, 313-323.

Evolution of aluminum-alloy scaffold tubing, with comparative analysis of the properties desired and existing, advantages offered, and general trend of current developments.

23d-116. Magnesium at Home. *Light Metals*, v. 11, June 1948, p. 328-336.

British applications of magnesium in the home, for military tanks, planes, automobile parts, and industrial equipment.

23d-117. Die Castings Speed Type-writer Production. *Aluminum Bulletin*, v. 1, June 1948, p. 3.

Use of Al die castings.

23d-118. New Cigarette Wrap Highlight of Recent Foil Developments. *Aluminum Bulletin*, v. 1, June 1948, p. 4-5.

23d-119. Aluminum as a Material for Electrical Conductors. Charles Braglio and R. R. Cope. *Electrical Manufacturing*, v. 42, July 1948, p. 74-79.

Comparative properties, including corrosion resistance, are given for various Al alloys and for coppers and brasses.

23d-120. A Shift in Design. *Die Castings*, v. 6, July 1948, p. 25-26, 43-47.

Use of aluminum die castings in Buick Dynaflo transmissions. Castings with cored-out passages replace a mass of pipes for hydraulic hook-up.

23d-121. Die Castings—A La Carte. *Die Castings*, v. 6, July 1948, p. 27, 53.

Rubber-tired golf-bag carrier is

built almost entirely of highly polished aluminum tubing assembled with die-cast aluminum joints and fittings.

23d-122. Minimizing Friction and Unbalance by the Use of Die Castings. *Die Castings*, v. 6, July 1948, p. 38-43.

Use of aluminum and magnesium die castings in gyroscopic instruments manufactured by Sperry.

23d-123. Aluminum Effects Weight Saving in Crane Structure. *Machine Design*, v. 20, July 1948, p. 131.

Crane used in a Canadian rod mill.

23d-124. Magnesium as Weight Saver. *Aviation Week*, v. 49, July 12, 1948, p. 21-22, 24-25.

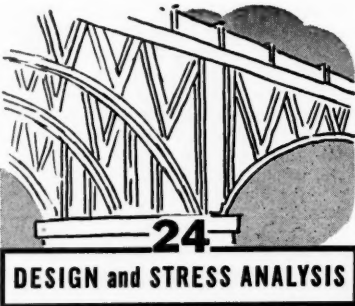
Information obtained in utilizing 8000 lb. of magnesium for various parts of the B-36.

23d-125. Aluminum in the Mining Industry. E. P. White. *Engineering and Mining Journal*, v. 149, July 1948, p. 85-89.

Application of high-strength aluminum alloys, such as Alcoa 61S-T6 and 14S-T6, to fabrication and maintenance of equipment.

For additional annotations indexed in other sections, see:

3c-51; 3d-35; 6d-17; 19d-38.



24a—General

24a-167. Stability of SR-4 Electric Strain Gages and Methods for Their Waterproofing and Protection in Field Service. A. Boodberg, E. D. Howe, and B. York. *American Society of Mechanical Engineers, Advance Paper No. 47-A-120*, 1947, 5 pages.

Tests with steel blocks determine effects of time in service, changes in temperature, humidity, methods of mounting and of several waterproofing agents upon the stability of SR-4 electric strain gages; and also to determine the protecting qualities and durability of waterproofing agents and coverings that can be conveniently applied under field conditions.

24a-168. A Variational Principle of Maximum Plastic Work in Classical Plasticity. R. Hill. *Quarterly Journal of Mechanics and Applied Mathematics*, v. 1, March 1948, p. 18-28.

Classical equations of Levy-Mises and Prandtl-Reuss for an ideally plastic material. Uniqueness theorems for a completely plastic body under prescribed boundary conditions. The variational principle is applied to problem of a uniform bar of arbitrary section deformed in combined tension, torsion, and bending. 20 ref.

24a-169. The Formation and Enlargement of a Circular Hole in a Thin Plastic Sheet. G. I. Taylor. *Quarterly Journal of Mechanics and Applied Mathematics*, v. 1, March 1948, p. 103-124.

Mechanics of deformation which occurs when a circular hole is made

in a flat sheet by a conical-headed bullet or by outward radial pressure on its edge, causing metal near the hole to pile up into a thickened crater.

24a-170. Theory of Plastic Flow Versus Theory of Plastic Deformation. W. Prager. *Journal of Applied Physics*, v. 19, June 1948, p. 540-543.

Typical theories and the concept of neutral change of stress. A neutral change of stress can be considered as a limiting case of either loading or unloading. Theories of plastic flow, but not those of plastic deformation, agree with the logical assumption that the stress-strain relations for both loading and unloading should predict the same change of strain for neutral change of stress.

24a-171. Strain Energy in Greatly Deformed Elastic or Inelastic Anisotropic Engineering Metals. K. H. Swaininger. *Journal of the Franklin Institute*, v. 245, June 1948, p. 501-515.

Previously abstracted from *Philosophical Magazine*, series 7, v. 38, June 1947, p. 422-438. See item 24a-17, 1948.

24a-172. New Development in Gearing Studied at A.G.M.A. Meeting. *Iron Age*, v. 161, June 24, 1948, p. 79-81.

Reviews papers and discussions presented at 32nd Annual Convention, Hot Springs, Va., June 7-9, 1948.

24a-173. Design Stress Factors. Joseph P. Vidosic. *Journal of Engineering Education*, v. 38, May 1948, p. 653-658. 15 ref.

24a-174. Determination of Stresses in Gas-Turbine Disks Subjected to Plastic Flow and Creep. M. E. Millenson and S. S. Manson. *National Advisory Committee for Aeronautics, Technical Note No. 1636*, June 1948, 45 pages.

Application of finite-difference method. Calculation of stresses during one turbine-operating cycle; and stresses in a disk with a central hole. Plastic flow markedly alters elastic-stress distribution and if the amount of creep is small, the effect on stress distribution is also small.

24a-175. Metals in Service. P. M. Hess. *Iron and Steel Engineer*, v. 25, June 1948, p. 65-75; discussion, p. 75-76.

Various cases of failure, excessive corrosion, and excessive wear resulting from failure to apply scientific principles of design and selection of alloys.

24a-176. The Design of Dynamically Loaded Extension and Compression Springs. Curt I. Johnson. *Machinery*, v. 54, July 1948, p. 174-178.

Development of the basic equations. (To be continued).

24a-177. Sallient Features of Hand-wheel Design. (Concluded.) H. F. Williams. *Machine and Tool Blue Book*, v. 44, July 1948, p. 153-154, 156-160, 162-164, 166-167.

Positioning of handles, knobs, and knobbed handwheels on machine tools.

24a-178. Common Sense of Spring Design. Ronald F. Pond. *Iron Age*, v. 162, July 1, 1948, p. 82-85, 93.

Common errors of spring design and a number of suggestions for assuring maximum performance at minimum cost.

24a-179. Photo-Elasticity; Recent Developments in an Advanced Testing Technique. (Concluded.) J. Ward. *Automobile Engineer*, v. 38, June 1948, p. 223-227.

24a-180. Piston Design; the Trend of Developments as Indicated by Current Patents. *Automobile Engineer*, v. 38, June 1948, p. 229-234.

The essential features of a series (Turn to page 56)

Stainless Steels Prove a Boon to Process Industries

Reported by John T. O'Connor
Firestone Tire & Rubber Co.

Production of stainless steel at present is about 513,000 tons annually, in some 50 different analyses, Stanley P. Watkins, manager of the development department, Rustless Division, Armco Steel Corp., told the Akron Chapter A.S.M. on May 12. Mr. Watkins closed the 1947-48 season by presenting a talk on "Stainless and Heat Resistant Steels".

While the properties of some stainless grades appear to overlap in certain respects, on close analysis, one grade generally stands out as best and most economical. Selection of the appropriate grade involves a number of considerations, such as service conditions, machinability, formability, weldability, and initial cost.

The stainless steels have proven a boon to the process industries, since they are resistant to a host of chemicals and process solutions. Moreover, the cost is reasonable and they are available in conventional forms and can be fabricated with standard metalworking equipment.

In general, the corrosion resistance of stainless steels increases as the alloy content is raised, but not in direct proportion. About 12% chromium is required to produce stainless properties, and this alloy is usually used where corrosive environment is mild. The well-known 18-8 alloys are immune to food acids. Addition of molybdenum to these alloys increases resistance to reducing acids such as sulphuric and hydrochloric. All the stainless steels are highly resistant to oxidizing acids such as nitric.

Further attributes are resistance to oxidation and maintenance of strength at high temperatures. Consequently they are widely used for jet engine combustion chambers and furnace parts. New high-temperature superalloys contain—in addition to chromium and nickel—molybdenum, tungsten, and columbium.

Because of the toughness of stainless steel (particularly the chromium-nickel grades), it is difficult to machine. Free-machining grades are now on the market that contain 0.25% sulphur or selenium; their impact resistance, however, suffers.

Although the tensile strength and hardness of chromium-nickel stainless grades are higher than for deep drawing carbon steel sheets, the former is superior for deep and severe draws because of its high ductility.

However, it requires more power and heavier machinery.

Among the heat resistant steels, alloys such as 17-14 Cu-Mo alloy possess greater creep strength but less oxidation resistance than some of the stainless grades, Mr. Watkins noted. Also, in general, the higher the chromium content the more scale resistant is the alloy at elevated temperatures.

J. Leo Miller, manager of Firestone stainless steel production, was the technical chairman and conducted a question period that brought out some points on machining and electropolishing. Some work has been done on the use of lead for increasing machinability of stainless grades. The pros and cons of the passivation treatment of 18-8 stainless, and its value in affording protection for exposure at atmospheric and higher temperatures, were also debated.



HERE'S HOW . . .

To get copies of articles annotated in the
A.S.M. Review of Current Metal Literature

Two alternative methods are:

1. Write to the original source of the article asking for tear sheets, a reprint or a copy of the issue in which it appeared. A new list of addresses of the periodicals annotated is now on the press and will be available on request.
2. Order photostatic copies from the New York Public Library, New York City, or from the Engineering Societies Library, 29 West 39th St., New York 18, N. Y. A nominal charge is made, varying with the length of the article and page size of the periodical.

Write to Metals Review for free copy of
the address list

METALS REVIEW

7301 Euclid Ave.

Cleveland 3, Ohio

METALLURGICAL ABSTRACTS (GENERAL AND NON-FERROUS)

Comprehensive and authoritative, will keep you informed of the world's progress in research and practice in general and non-ferrous metallurgy.

Free to members of the Institute of Metals, they may be obtained by non-members either monthly, with the *Journal of the Institute of Metals* for £5 per annual volume or bound for £3 per annum (not including the *Journal*), both inclusive of indexes and the former inclusive of binding case.

The sections cover (1) properties of metals; (2) properties of alloys; (3) structure; (4) dental metallurgy; (5) powder metallurgy; (6) corrosion and related phenomena; (7) protection; (8) electro deposition; (9) electro-metallurgy and electro chemistry; (10) refining; (11) analysis; (12) laboratory apparatus, instruments, etc.; (13) physical and mechanical testing, inspection and radiology; (14) temperature measurement and control; (15) foundry practice and appliances; (16) secondary metals, scrap, residues, etc.; (17) furnaces, fuels and refractory materials; (18) heat-treatment; (19) working; (20) cleaning and finishing; (21) joining; (22) industrial uses and applications; (23) miscellaneous; (24) bibliography; (25) book reviews.

Nature says: "To the Metallurgists, both theoretical and practical, as well as to chemists, physicists and engineers, these volumes have become essential."

A specimen copy may be obtained from:

THE INSTITUTE OF METALS

4 Grosvenor Gardens, LONDON, S.W.1., England.

of recent British patents dealing with wear, seizing, costs, gas tightness, temperature, lubrication seal, combustion efficiency, and corrosion.

24a-181. What Kind of Information Does Brittle Coating Give? Part II. A. J. Durelli. *Product Engineering*, v. 19, July 1948, p. 133-136.

Theoretical considerations developed in Part I are applied to distribution of stresses in a ring under diametral compression. Results are checked against values given by photo-elastic studies. 20 ref.

24a-182. Fundamental Factors of Practical Die Design. S. P. Karnitz. *Tool Engineer*, v. 21, July 1948, p. 34.

24a-183. Car Body Testing Short-Cuts Stress Analysis. SAE Journal, v. 56, July 1948, p. 46-48. Based on Stress Engineering as Applied to Automotive Bodies, by Philip O. Johnson and Russell G. Heyl, Jr. (To be published in full in SAE Quarterly Transactions.)

Methods using strain gages to divulge magnitude of various loads and bending moments on car-door frames.

24a-184. An Optical Rectangular Rosette Extensometer for Large Strains. K. H. Swainger and J. Twyman. *Journal of Scientific Instruments and of Physics in Industry*, v. 25, June 1948, p. 187-189.

Designed to measure both longitudinal and orthogonally transverse strains over large ranges with fairly high sensitivity.

24b—Ferrous

24b-71. Some Characteristics of Residual Stress Fields During Dynamic Stressing Above the Endurance Limit. James B. Duke. *American Society for Testing Materials, Preprint No. 30*, 1948, 8 pages.

Investigation on samples of S.A.E. 1020 and S.A.E. 4130 steel using a comparative magnetic process to determine both fatigue damage and direction and relative magnitude of residual stress fields set up during endurance life of the metal. Results indicate that valuable information on progress of plastic deformation due to differential cold working, prediction of failure from fatigue, and several magnetic properties not easily measured can be obtained regardless of heat treatment or composition of the steel.

24b-72. Concerning Stress Conditions in a Round Iron Plate With Definite Crystal Structure During Deep Drawing. Part I. (In Russian.) K. V. Grigorov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 175-186.

The azimuthal distribution of stresses was calculated for different types of crystal structures. It was found to be highly anisotropic and independent of structure. 12 ref.

24b-73. Laboratory Measurements of Stress Distribution in Reinforcing Steel. Douglas McHenry and W. T. Walker. *Journal of the American Concrete Institute*, v. 19, (Proceedings, v. 44), June 1948, p. 1041-1054.

Typical laboratory test results on stress distribution of simple reinforced beams before and after cracking, and comparison of these results with stresses computed by conventional methods. Possible applications of the gaging method as well as to its limitations.

24b-74. Standardized Welded Connections Cut Costs for Research Building. La Motte Grover. *Engineering News-Record*, v. 140, June 24, 1948, p. 89-91.

Use in structural frame.

24b-75. Evolution in Chilled Wheel

Rims. Railway Age, v. 124, June 26, 1948, p. 86-87.

Development of improved structures which have reduced failures for comparable service for wheels cast in 1944 to one-third as many as occurred in those cast in 1930-1939. Experimental design for increased flange and rim strength.

24d—Light Metals

24d-23. Engineering for Aluminum-Alloy Castings. T. R. Gauthier and H. J. Rowe. *Mechanical Engineering*, v. 70, June 1948, p. 505-514.

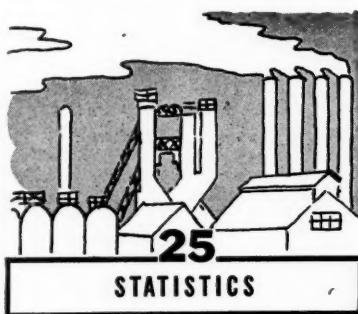
Previously abstracted from *American Foundryman*, v. 13, Feb. 1948, p. 27-36. See item 24d-8, 1948.

24d-24. Light Alloys Need New Design Concepts. J. A. Gregoire. *Product Engineering*, v. 19, July 1948, p. 81-85.

Is the simple substitution of a light alloy for steel a good design practice? The author holds that substitution produces only an approximation of the possibilities. He calls for a complete break with traditional design when using light alloys. Examples of European practice in automotive design.

For additional annotations indexed in other sections, see:

3d-36; 19a-134; 22b-220-224-228.



25a—General

25a-41. Illinois Mineral Industry in 1946. Walter H. Voskuil. *Geological Survey Division, State of Illinois (Urbana), Report of Investigations No. 127*, 1947, 123 pages.

Statistics on both metallic and nonmetallic materials.

25a-42. The Unit Processes of Chemical Metallurgy. R. Schuhmann, Jr. *Metals Technology*, v. 15, June 1948, T.P. 2363, 6 pages.

List of unit processes in specific terms, the scientific and engineering principles basic to all of them, and how these ideas have been applied to a reorganization of instruction in chemical metallurgy at M.I.T.

25a-43. Stockpiling and Industrial Planning. O. O. Niergarth. *Journal of American Zinc Institute*, v. 25, 1946-1947, p. 96-103.

Discussed by a Colonel in the Army and Navy Munitions Board.

25a-44. Subsidies—Pro and Con. Evan Just. *Journal of American Zinc Institute*, v. 25, 1946-1947, p. 114-119; discussion, p. 119-120.

A practical presentation of heat treatment theory
PRINCIPLES OF HEAT TREATMENT
by M. A. Grossmann
244 pages—\$3.50

American Society for Metals
7301 Euclid Ave. Cleveland 3, Ohio

25b—Ferrous

25b-64. An Investigation of the Feasibility of a Steel Plant in the Lower Columbia River Area Near Portland, Oregon. Raymond M. Miller. *Department of Geology and Mineral Industries, State of Oregon*, (Portland), Bulletin No. 8, 1940, 55 pages.

Production, consumption, and costs.

25b-65. Basic Guide to Ferrous Metallurgy. *Power Generation*, v.52, May 1948, p. 84.

Working characteristics of steels at temperatures from -300 to 2900° F. All the important temperature zones, including hot working, annealing, normalizing, stress relieving, carburizing, and preheating for welding are clearly defined.

25b-66. Soviet Union Builds Large Northwestern Steel Center. Ivan Bardin. *Engineering and Mining Journals*, v. 149, June 1948, p. 92-94.

Project is "probably well under way".

25b-67. The Hematite of Labrador and New Quebec. W. M. Bonham. *Canadian Mining Journal*, v. 69, June 1948, p. 67-70.

Available supply and efforts being made to secure it.

25b-68. Progress in Alloy Steels Marked by Large Consumption of Nonferrous Metals. Herbert J. French. *Mining and Metallurgy*, v. 29, June 1948, sec. 1, p. 336-340.

Economic and technological development.

25b-69. French Alloy and Tool Steel Industry. *Iron Age*, v. 162, July 1, 1948, p. 80-81.

Map and list of companies; exact locations of the major producers and the types of steel each specializes in.

25b-70. Market Trends and New Developments in Steel. D. H. Malcom. *Stove Builder*, v. 13, July 1948, p. 53-54, 58, 60, 62, 64.

Excerpts from address at 1948 summer meeting of the Institute of Cooking and Heating Appliance Manufacturers.

25b-71. Market Outlook for Galvanized Sheets. E. F. Lundeen. *Journal of American Zinc Institute*, v. 25, 1946-1947, p. 73-79.

25b-72. Market Outlook for Job Galvanizing. D. M. Strickland. *Journal of American Zinc Institute*, v. 25, 1946-1947, p. 79-83.

25c—Nonferrous

25c-48. Titanium in Florida. *Mining World*, v. 10, June 1948, p. 27.

Source of supply.

25c-49. Outright Repeal or Long-Term Suspension of Excise Tax on Copper Imports Deemed Urgent. John A. Danaher. *Metals*, v. 18, June 1948, p. 7-9, 11.

25c-50. Insufficiency of Lead Supply in U. S. to Continue as Long as Business Boom Lasts. Robert L. Ziegfeld. *Metals*, v. 18, June 1948, p. 10-11.

25c-51. Who Has the Gold? Ira B. Joralemon. *Engineering and Mining Journal*, v. 149, July 1948, p. 76-79.

A statistical summary on world production and distribution.

25c-52. Zinc Metal Supply—Domestic and Foreign. T. H. Miller and R. H. Mote. *Journal of American Zinc Institute*, v. 25, 1946-1947, p. 42-51; discussion, p. 51-52.

25c-53. Market Outlook for Die Cast-

(Turn to page 58)

F.B.I. Agent Tells About Scientific Crime Detection

Reported by Warren F. Savage
Research Fellow
Rensselaer Polytechnic Institute

Feature event at the annual meeting of the Eastern New York Chapter A. S. M. on May 11 was an address on "Modern Scientific Crime Detection" by Special Agent Arthur Cornelius, Jr., who is in charge of the Albany Field Office of the Federal Bureau of Investigation.

After showing a motion picture filmed by the March of Time and depicting the service of the F. B. I. during the war years, Mr. Cornelius spoke on modern scientific methods employed in the detection and investigation of violations of federal laws.

New Film on Cutter Bits

A new 16-mm. color sound film, "Grinding and Use of Basic Lathe Tool Cutter Bits" has been announced by the South Bend Lathe Works. It is the third in a series of films based

on the book "How to Run a Lathe". Screen time is about 20 min. each.

The films are distributed on a free loan basis and are also available for outright purchase. Complete information can be had by writing to the South Bend Lathe Works, 325 East Madison St., South Bend 22, Ind.

AEC Dedicates Laboratory

Iowa State College, Ames, Iowa, recently held a cornerstone-laying ceremony at the metallurgy building of the newly named Ames Laboratory of the United States Atomic Energy Commission.

During the war the Manhattan District maintained a project at Ames, and after V-J Day, Iowa State College established the Institute for Atomic Research under the direction of F. H. Spedding. Recently the Commission, in view of the importance of the work done at Ames, decided that its project would be officially known as the Ames Laboratory of the United States Atomic Energy Commission and become one of the permanent laboratories of the Commission.

Sales Promotions Announced

Allegheny Ludlum Steel Corp. has announced several changes in its sales department. Truman B. Brown, former assistant manager of cutting and toolsteel sales, with offices in Pittsburgh, has been appointed assistant district manager of sales for the Detroit territory. Robert S. Ahlbrandt will succeed Mr. Brown, and in turn be succeeded as district manager of sales for the Pittsburgh territory by Max J. Pischke, formerly manager of warehouse and jobber sales.



EMPLOYMENT SERVICE BUREAU

The Employment Service Bureau is operated as a service to members of the American Society for Metals and no charge is made for advertising insertions. The "Positions Wanted" column, however, is restricted to

members in good standing of the A. S. M. Ads are limited to 50 words and only one insertion of any one ad. Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, Ohio, unless otherwise stated.

POSITIONS OPEN

East

INSTRUCTOR: For metallurgical engineering courses. Minimum requirements, M.S. in metallurgical engineering plus two years' industrial or teaching experience. Knowledge of thermodynamics, stress analysis, or foundry practice an advantage. Give full information including minimum salary in first letter. Box 8-5.

Midwest

WELDING RESEARCH OPPORTUNITIES: Metallurgists, mechanical engineers, or similarly trained men interested in welding research are invited to investigate the attractive vacancies in our welding research division. Prompt handling and confidential treatment of all applications. Address replies directly to Battelle Memorial Institute, 505 King Ave., Columbus 1, Ohio.

TECHNICAL PERSONNEL: New research and development laboratory being established has many openings for trained personnel interested in research. Mechanical engineer, test engineers, stress analyst, assistant test engineer, welding research metallurgist, electrical research engineer and physicist are positions available. College training necessary for all jobs. Box 8-10.

FELLOWSHIPS: Teaching assistantships, industrial fellowships and scholarships in amounts up to \$1200 per year. Opportunities available in fields of steel founding, electric steel smelting, X-ray diffraction, physical metallurgy, coal mining and application. Address inquiries to C. S. Crouse, Head, Department of Mining and Metallurgical Engineering, University of Kentucky, Lexington, Ky.

PHYSICAL METALLURGIST: Excellent opportunity for graduate M.S. or Ph.D. metallurgist to conduct fundamental research in physical metallurgy. Should be able to initiate and carry out over-all research program. Salary and position commensurate with background and experience. Metals Research Dept., Armour Research Foundation, Chicago 16, Ill.

FOUNDRY RESEARCH METALLURGIST: Experienced metallurgist with foundry background desired for work on both fundamental and applied research problems. Should be able to initiate and carry out over-all research program. Salary and position commensurate with background and experience. Metals Research Dept., Armour Research Foundation, Chicago 16, Ill.

RESEARCH ASSISTANT: Graduate metallurgist, physicist, or physical chemist for full-time work on problems involving the diffusion of elements in steel. Opportunity for tuition for advanced study in night school. Salary range—\$225 to \$275 depending on qualifications. State background in letter. Metals Research Laboratory, Carnegie Institute of Technology, Pittsburgh 13, Pa.

METALLURGIST: Excellent opportunity for metallurgists interested in development or research. Need metallurgist with B.S., M.S., or Ph.D. degrees, with or without additional experience, to work in connection with development of nuclear reactors and basic research. Salary based on education and experience. Argonne National Laboratory, P. O. Box 5207, Chicago 80, Ill.

POSITIONS WANTED

CHEMIST-METALLURGIST: Seeks an executive position in a metal working company. Twelve years' experience with job electroplating and metal manufacturing. Familiar with all phases of metal and organic finishing; experienced in production research problems and labor relations. Excellent opportunity for the right company. Box 8-15.

FOR SALE

Immediately available 2 practically new car bottom stress relieving furnaces, oil fired and of recirculating type, completely equipped with motor operated doors and program instrumentation.

One furnace 12' wide x 22' long with capacity of 15 tons at 1200° F.; the other furnace 11'9" wide x 40' long with capacity of 30 tons at 1200° F. Complete installation available for inspection. Apply Box No. 100, Metals Review.

METALLURGIST: Age 28, married, 3 children, B. of Ch.E. 1942. Eight years' experience in heat treating, foundry, forge and laboratory. Desires position in Chicago area as chief metallurgist or assistant to chief metallurgist. Seeks permanent connection. Box 8-20.

METALLURGIST: Age 32. B.S. in chemical engineering. Experience includes five years with production problems relating to casting, forging, machining, heat treating ferrous and nonferrous alloys, physical testing and X-ray. Three years' experience in precision casting ferrous and nonferrous alloys. Consulting work in precision casting and foundry field. Box 8-25.

METALLURGICAL SALES ENGINEER OR HEAT TREAT SUPERINTENDENT: Seventeen years' diversified supervisory experience in all phases of heat treating, carburizing, nitriding, induction hardening, aircraft and production hardening of nonferrous metals and stainless steels; lab control. B.S. and M.E. degrees. 35 years old, married. Desires location in Detroit area. Box 8-30.

METALLURGICAL ENGINEER: Desires position in production, development, or metallurgical service. Will travel. Prefers Middle West. B.S. from Carnegie Institute of Technology. Two years general production and laboratory training. Two years research. Single, age 28, two dependents. Box 8-35.

METALLURGICAL - MECHANICAL ENGINEER: Tin-plate specialist. Age 29, married. B.S., with majors in chemistry and mechanical engineering. Eight years' experience in research, mechanical testing, metallography, mill operations, and supervision in large sheet and strip mill. Desires change to Chicago with work in metallurgical and mechanical engineering. Box 8-40.

METALLURGICAL ENGINEER: Twenty-four years' experience in steel mills and automotive plants. Desires executive position. Thorough knowledge of modern methods of heat treatment and metallurgical processing that have resulted in lowering of manufacturing costs. Best of references. Box 8-45.

ings. David Laine. *Journal of American Zinc Institute*, v. 25, 1946-1947, p. 83-90.

25c-54. Market Outlook for Brass. H. A. Schlieder. *Journal of American Zinc Institute*, v. 25, 1946-1947, p. 91-93.

25c-55. Market Outlook for Rolled Zinc. H. D. Carus. *Journal of American Zinc Institute*, v. 25, 1946-1947, p. 93-95.

25c-56. Zinc Ore Supply—Domestic and Foreign. G. C. Heikes. *Journal of American Zinc Institute*, v. 25, 1946-1947, p. 104-113; discussion, 113-114.

25d—Light Metals

25d-14. Caribbean Aluminum Ores. O. C. Schmedeman. *Engineering and Mining Journal*, v. 149, June 1948, p. 78-82.

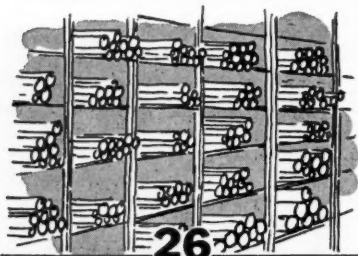
Immense deposits of a new type of high-quality aluminum ore have been discovered and proved during the past five years in the islands of Jamaica and Hispaniola.

25d-15. The Aluminum Industry. How to Increase the Supply. W. B. Griffin. *Modern Metals*, v. 4, June 1948, p. 13-20.

World aluminum situation and suggestions for increasing the domestic supply.

For additional annotations indexed in other sections, see:

2b-138; 23b-34; 27a-100-106.



MISCELLANEOUS

26a—General

26a-56. German Metallurgical Practice Reviewed. Paul M. Tyler. *Mining and Metallurgy*, v. 29, June 1948, sec. 1, p. 326-329.

Disclosures of postwar technical intelligence investigations.

26a-57. Metallurgical and Economic Problems of Atomic Power Plants. Sumner T. Pike. *Metal Progress*, v. 53, June 1948, p. 823-826.

Metallurgical work necessary to provide creep resistant alloys, inert to radioactivity, for tubes at 2000° F. in "boilers" fired by atomic energy; suitable fluids (possibly molten metal) for transferring heat from reactor to engine.

26a-58. Research Work of the Physics Laboratory at University College, London. E. N. da C. Andrade. *British Science News*, v. 1, no. 8, 1948, p. 14-16.

Researches on sound, problems of liquid viscosity, creep of polycrystalline metals, monocrystalline wires, and influence of surface conditions on crystal behavior.

26a-59. Friction and Wear of Metals in the Presence of Liquid Gases. P. I. Rumin and Yu. N. Riabinin. *Engineers' Digest*, (American Edition), v. 5, May-June, 1948, p. 186. Translated and condensed from *Kislodod*, (Oxygen), no. 4, 1946, p. 35-41.

Experiments to determine co-

efficients of friction and resistance to wear of various metals.

26a-60. The Imperfect Film Lubrication of Sliding Journals. L. Leloup. *Engineers' Digest* (American Edition), v. 5, May-June 1948, p. 200-204. Translated and condensed from *Revue Universelle des Mines*, v. 3, No. 10, 1947, p. 373-419.

Influence of tangential forces on oil-film lubrication of bearings. Critical points and effects of surface condition of various bearing metals as factors in imperfect lubrication.

26a-61. Skinfluence. *Industrial and Engineering Chemistry*, v. 40, July 1948, p. 7A, 10A.

Fundamental work being done on the nature of liquid surfaces. Applications to diverse scientific problems in metallurgy, lubricants, insecticides, polymers, and paints are indicated. It has been found that the surface effect of some liquids extends to a depth of 1000 molecules.

26a-62. Technique of Experimenting in the Factory. Leonard A. Seder. *Mechanical Engineering*, v. 70, July 1948, p. 593-598.

Application of statistical techniques in planning industrial research. Examples dealing with etching of aluminum and bonding resin-coated paper to sheet metal.

26a-63. Gear Lubrication in Modern Industrial Applications. A. F. Brewer. *Steel*, v. 123, July 12, 1948, p. 88-92, 122.

Required lubricant properties, including the mechanisms of lubricant-film failure and resulting breakage or excessive wear of the gears. Different types of gear damage which occur.

26d—Light Metals

26d-4. Industrial Aluminum: A Brief Survey. Leslie L. Motz. *Dept. of Geology and Mineral Industries, State of Oregon*, (Portland), G.M.I. Short Paper No. 2, 1943, 7 pages.

Physical characteristics, supply, ore and production, and processes for manufacture.

26d-5. How to Work Aluminum and Its Alloys. Anderson Ashburn. *American Machinist*, v. 92, July 1, 1948, p. 85-100.

Special report covers alloying ingredients; nomenclature; strain hardening; thermal treatments; properties; machining; shearing; blanking and punching; bending; forming; drawing; spinning; casting and forging; joining; and cleaning and finishing.

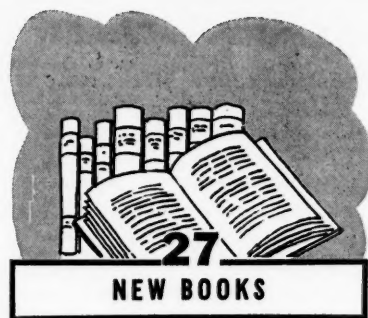
A new approach to the science of metallography by an outstanding expert

METALLOGRAPHIC TECHNIQUE FOR STEEL

by J. R. Vilella

85 pages—\$2.00

American Society for Metals
7301 Euclid Ave. Cleveland 3, Ohio



NEW BOOKS

27a—General

27a-93. Precision Workshop Methods. H. J. Davies. 324 pages. Edward Arnold and Co., London, England. \$5.

Compiled from notes used in teaching a course in machine shop work for engineering students. An appendix giving information for calculating measurement of effective diameter of V-threads and a description of the British standard system of limits and fits for engineering.

27a-94. Modern Workshop Technology. Vol. 1. H. Wright Baker, Editor. 445 pages. Cleaver-Hume Press, Ltd., 42a S. Audley St., London, W. 1, England. 28s.

Surveys materials and processes employed in the engineering industries. It is divided into seventeen sections each written by a specialist. The subjects covered are: Iron and steel, cast iron, foundry practice, forging, drop forging, structure and heat treatment of steel, surface hardening of steel, steel sheet and strip, welding, application of welding to general engineering, aluminum and magnesium, nickel and high-nickel alloys, copper and copper alloys, die casting, powder metallurgy, engineering plastics, testing, and inspection.

27a-95. Le Soudage Electrique par Resistance. (Electrical Resistance Welding.) Jean Negre. 432 pages. Publications de la Soudure Autogene, 39 Rue d'Amsterdam, Paris 8e, France. 1350 francs.

Methods of resistance welding and their industrial applications, with special emphasis on spot welding. Fundamentals affecting the production of spot welded assemblies, the strength of spot welds, machine and electrode design, control systems, and special types of resistance welders. Seam and butt welding, and welding problems involved in work on various aluminum alloys, stainless steels, and the welding of dissimilar materials.

27a-96. An Introduction to Metallic Corrosion. U. R. Evans. 211 pages. Edward Arnold & Co., London, England.

Intended for university students, scientists having no knowledge of the particular field, and others who encounter corrosion problems. General principles are explained and illustrated with examples.

27a-97. Korroziya Metallovs Kislородnoi Depolyarizatsel. (Corrosion of Metals with Oxygen Depolarization.) N. D. Tomashov. 258 pages. 1947. Academy of Sciences of the U.S.S.R., Moscow and Leningrad, U.S.S.R.

Results of a number of years' work on the corrosion of metals. A theoretical analysis of some general problems of electrochemical corrosion, and an exhaustive treatment of corrosive processes which take

(Turn to page 60)

MANUFACTURERS' LITERATURE

Use the Handy Coupon to Obtain This Helpful, Free Literature

83. Babbitt Metal

New brochure and engineering brief on silver babbitt metal shows users of tin-base babbitt metal how to beat current tin shortage. Physical properties and pouring procedures are given. National Bearing Div., American Brake Shoe Co.

84. Blowers

16-page booklet describes with pictures many types of industrial blowers, fans and exhausters. General Blower Co.

85. Bronze Bushing

Bronze bushing bar stock produced by the centrifugal casting process is listed in complete range of standard diameters and approximate weights on a handy standard stock guide for use as wall chart or file folder. Shengano-Penn Mold Co.

86. Carbide Tools

Revised tool catalog 48-T covers Talide tungsten carbide tools and tips. Incorporates new standard identification numbers recently adopted by the carbide industry. Includes several new styles and sizes of cutting tools and tips. Metal Carbides Corp.

87. Die Casting

4-page bulletin describes Model 200 universal die casting machine, with either a hot metal end for casting zinc, tin or lead; or as a cold chamber machine for casting aluminum, magnesium or brass. Cleveland Automatic Machine Co.

88. Fabrication, Light Metals

Engineering, tool and production facilities offered by sheet metal fabricator specializing in the light metals are described and illustrated in 20-page brochure. Colgate Mfg. Co.

89. Forgings

Numbers 1 and 2, Volume 10 of "Forgings" features the farm and petroleum field. Many illustrations and interesting material on forgings for these industries are shown in an attractive manner. Kropp Forge Co.

90. Furnaces, Heat Treating

8-page booklet illustrates gas, oil and electric heat treating and carburizing furnaces. Holcroft and Co.

91. Gray Iron

12-page booklet assists metal men in specifying and designing gray iron components with facts on mechanical and engineering characteristics on gray iron. Gray Iron Founders' Society, Inc.

92. Grinding Wheels

28-page catalog and price list covers high speed grinding wheels for use in steel mills, foundries and metal fabricating plants. U. S. Rubber Co.

93. Magnet Material

"Hardyne", an easily fabricated permanent magnet material that may be pressed to form complex shapes requiring no sintering discussed in July 15 issue Metal Powder News. Charles Hardy, Inc.

94. Metallurgical Products

84-page catalog No. 1 covers products of this company, including various special metals and alloys, line of special metallurgical products and welding tips and holders. P. R. Malloy & Co.

95. Metal Sawing

16-page booklet unique engineering experience embodied in line of four basic circular sawing machines for cutting stock from 1/4" to 16 1/2", all utilizing the advantages of the triple-chip saw blade in diameters from 8" to 45", with correct automatic sharpeners to grind all blade sizes. Motch & Merryweather Machinery Co.

96. Metal for Industry

Colorful 24-page booklet outlines the operations of the units of this company in the processing of metals in combination with other metals to make a wide range of alloys, to design and produce tools, dies and stampings, make tool steel, weave metal cloth, and shear and slitter knives. Continental United Industries Co., Inc.

97. Nickel

Nickel silver and nickel brass rods, extruded shapes, forgings and die castings are illustrated in 4-page folder. Analyses, physical properties and corrosion tests included. Titan Metal Mfg. Co.

98. Plating Rack Coating

4-page leaflet describes "Enthonite 101" a new liquid plastic plating rack coating. Material also has extensive use for coating metals to resist severely corrosive organic materials. Enthone, Inc.

99. Press

New bulletin describes an expanded line of hydraulic presses for straightening both rough and finished work. Colonial Broach Co.

100. Pyrometer Controller

Bulletin PB1237 describes proportional current-input electronic pyrometer controller and its applications. Bristol Co.

101. Rust Inhibitor

Water-emulsion used as a rust-inhibiting coating for metals and applied by dipping, spraying, wiping or flow coating is described in new literature. S. C. Johnson & Son, Inc.

102. Selenium Rectifiers

8-page catalog describes and illustrates with engineering data a complete line of selenium rectifiers for electro-plating and other industrial uses. Richardson-Allen Corp.

103. Stainless Steel

8-page bulletin describes a high alloy low carbon austenitic stainless steel known as Durimet 20, for use with about 125 corrosive solutions. Duriron Co., Inc.

104. Tube Testing

Testing machine for hydrostatically testing steel tubes or pipes in sizes from 1" to 4" O.D.; lengths from 10' to 26' and at test pressures ranging from 750 psi to 3000 psi described in bulletin. R. D. Wood Co.

MAIL THIS COUPON TO

Metals Review

7301 Euclid Avenue
Cleveland 3, Ohio

83	91	99
84	92	100
85	93	101
86	94	102
87	95	103
88	96	104
89	97	
90	98	

I am interested in the literature circled at the left. Please have it sent to me, without obligation.

NAME

TITLE

COMPANY

PRODUCT MANUFACTURED

ADDRESS

CITY & STATE

Students write direct to manufacturers. Coupon must be mailed prior to November 15, 1948.

(59) AUGUST, 1948

place during oxygen depolarization. (Includes a seven-page summary in English.)

27a-98. Sampling Inspection. Statistical Research Group, Columbia University. 395 pages. McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. \$5.25.

Elementary concepts of acceptance sampling; and standard sampling-inspection plan; presented with detailed instructions so that the principles developed and plans provided can be put to practical use in industrial plant.

27a-99. The Science & Practice of Welding. Edition 3. A. C. Davies. 446 pages. 1947. Cambridge University Press, Cambridge, England.

Basic theoretical principles underlying various processes of welding and practical methods of applying them. Engineering drawing.

27a-100. Metal Statistics: 1948. Annual Edition 41. 848 pages 1948. American Metal Market, 18 Cliff Street, New York 7, N. Y. \$2.00.

General assortment of statistical information on ferrous and nonferrous metals, and miscellaneous economic subjects.

27a-101. Colorimetric Methods of Analysis. Ed. 3. Vol. I. Foster Dee Snell and Cornelia T. Snell. 239 pages. 1948. D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, N. Y.

Theory, instruments, and pH determinations. Nephelometric and turbidimetric methods. New equipment and methods of spectrophotometry, filter-photometry, photo-electric filter-photometry, and hydrogen-ion analysis.

27a-102. Salt Baths for the Treatment of Metals. T. A. Hood. 116 pages. Nov. 1947. Munitions Supply Laboratories, Dept. of Munitions, Commonwealth of Australia, Maribyrnong, Victoria, Australia. (Information Circular 9.)

Heat treatment of high speed, stainless and other steel, patenting of steel wire, solution heat treatment and annealing of aluminum-base and copper-base alloys, cleaning of ferrous metals, cyaniding, liquid nitriding, and liquid carburizing of steel. Construction and characteristics of various types of salt bath furnaces.

27a-103. Modern Metallurgy for Engineers. Ed. 2. Frank T. Sisco. 499 pages. 1948. Pitman Publishing Corp., 2 W. 45th St., New York, N. Y.

Two new chapters on hardenability of steel and one or more sections in practically every other chapter have been added. A considerable portion of the material contained in the first edition has been at least partially rewritten. (From review in *Materials & Methods*, v. 27, June 1948.)

27a-104. Alloys for Use at High Temperature—Report on Visit to Germany and Austria. W. J. Robinson. 79 pages. 1947. Mapleton House, 5415 17th Ave., Brooklyn, N. Y. \$4.50.

The materials which had been developed to meet these conditions. Testing methods and machines.

27a-105. La Photoélasticité. A. Pirard. 419 pages. 1947. Dunod, 92 Rue Bonaparte, Paris 6, France.

Following an extended discussion of the theory of elasticity, this text takes up the subject of photoelasticity from both the theoretical and practical points of view. Birefringence and polarization, materials and equipment for photoelastic examination, and practical applications are demonstrated with examples of photoelastic studies. (From review in *Mechanical Engineering*, v. 70, July 1948.)

27a-106. From the Ground Up. Paul M. Tyler. Ed. 1. 248 pages. 1948. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y., \$3.50.

Facts and figures of the mineral industries of the United States to provide a picture of the economic development and employment of natural resources and how they affect the welfare of the nation. Practical proposals for improving conditions in the industry.

27a-107. Metody Opredeleniya Obrabatyvaemosti Metallov. (Methods for Determination of the Machinability of Metals.) E. I. Fel'dshtein. 144 pages. 1946. State Scientific-Technical Publishing House, Moscow, U.S.S.R.

"Classical" methods for determination of machinability, rapid methods based on short-time tests, and the relationship between mechanical properties and machinability. Development of "face turning" and its application to practical problems.

27b—Ferrous

27b-35. Proizvodstvo Kovkogo Chuguna. (Production of Malleable Cast Iron.) Ed. 4. S. S. Nekrytyi. 472 pages. 1945. State Scientific-Technical Publishing House, Moscow, U.S.S.R.

Basic principles of malleable cast iron production. Rapid methods for annealing white cast iron products and the mechanism of their transformation into malleable cast iron. Physical and mechanical properties. Applications of malleable iron products as substitute metal for non-ferrous alloys.

27b-36. Copper as an Alloying Element in Steel and Cast Iron. Ed. I. C. H. Lorig and R. R. Adams. 213 pages. 1948. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y.

Pertinent information on ferrous materials containing small amounts of copper, as well as recent advances in the metallurgy of copper-bearing iron and steel. Properties, characteristics and applications of cast copper steels, wrought copper steels, copper bearing cast and malleable irons.

27c—Nonferrous

27c-11. Century of Silver: 1847-1947. Edition 1. Earl Chapin May. 388 pages. 1947. Robert M. McBride & Company, New York. \$3.50.

A comprehensive history of American silverware and of the silversmiths who produced it. How Yankee silversmiths produce beautiful and useful articles first from pewter then from britannia ware, and finally from plated and sterling silver. Full of colorful stories of New England peddlers and salesmen extraordinary, who distributed their articles of silver throughout the Atlantic seaboard by horse and wagon.

27c-12. The Plating of Zinc Alloy Die Castings. 132 pages. 1947. Zinc Alloy Die Casters Association, Lincoln House, Turl Street, Oxford, England.

Modern methods of coating zinc alloy die castings by electrodeposition of nickel, chromium, silver and other metals. Directions on the composition and maintenance of various baths used. Tests and specifications for adhesion and thickness of coatings.

27c-13. Les Radioelements Naturels. (The Natural Radio-Elements.) Irene Joliot-Curie. 191 pages. 1946. Hermann & Cie, 6, Rue de la Sorbonne, Paris, France.

Properties and methods of extraction and purification of the naturally-occurring radio-elements, as well as methods of determination. Methods of radiochemistry and its applications. An outline of our knowledge of artificial radio-elements.

27c-14. Quicksilver in Oregon. C. N. Schuette. 172 pages. 1938. Department of Geology and Mineral Industries, State of Oregon, Portland, Oregon. (Bulletin No. 4.)

A survey of deposits with general information on history, geology, mining, metallurgy, and economics of quicksilver.

27c-15. Federal Trade Commission Report on the Copper Industry. Part I. The Copper Industry of the United States and International Copper Cartels. 1947. U. S. Govt. Printing Office, Washington, 25, D. C.

A statistical summary.

27d—Light Metals

27d-10. Werkstoff Aluminium und seine anodische Oxidation. (Aluminum as a Material and Its Anodic Oxidation.) M. Schenk. 1042 pages. 1948. A. Francke, A. G. Berne, Switzerland. 138 Swiss francs.

The author has made notable contributions to research on anodizing and has first-hand knowledge of many of the fabricating processes used in the aluminum industry. The nature of aluminum alloys and the various preliminary or following treatments, such as heat treating or joining, which affect the anodizing process. Chemical and electrochemical behavior of aluminum, and the corrosion problems. Anodizing itself, with emphasis on the oxalic acid process. Costs, the patent literature, control and test methods, and choice of material.

27d-11. Analytical Methods for Aluminum Alloys. 103 pages. Aluminum Research Institute, 111 West Washington St., Chicago 2, Ill. \$1.00.

Chemical, photometric, and spectrographic methods for the quantitative determination of all elements commonly found in aluminum alloys. Methods for sampling ingots. The book is the result of 17 years of cooperative work in the laboratories of the members of A.R.I.

27d-12. Le polissage électrolytique des surfaces métalliques et ses applications. Tome I. aluminium magnésium, alliages légers. (Electrolytic Polishing of Metallic Surfaces and Its Applications. Vol. 1. Aluminum, Magnesium, and Light Alloys.) P. A. Jacquet. 359 pages. 1948. Editions Metaux, 32, Rue du Marechal Joffre, Saint-Germain-en-Laye (S. & O.), France. 3600 francs.

The method, its applications to the physicochemical and micrographic study of metals, and to commercial processes. The book will be of value to the metallurgist and physicist in the study of surfaces outside of field indicated by the title. 196 ref.

An indispensable reference book covering everything from constitution of alloys to mechanical working

PRACTICAL METALLURGY

by George Sachs and Kent R. Van Horn

567 pages—\$5.00

American Society for Metals
7301 Euclid Ave. Cleveland 3, Ohio

Mail This Hotel Reservation Form Now!

For the 30th

NATIONAL METAL CONGRESS & EXPOSITION

PHILADELPHIA COMMERCIAL MUSEUM and CONVENTION HALLS

Metal Exposition Opens Monday, October 25 to Friday, October 29

(Certain Technical Sessions Will Be Held Saturday and Sunday, October 23 and 24.)

Extensive plans are being completed to provide interest during your visit to the 30th National Metal Congress and Exposition. You won't want to miss this outstanding technical program and metal show. In view of the large number planning to attend, we urge you to order double rather than single rooms and plan joint reservations so as to occupy all double rooms and twin-bedded rooms to capacity.

Cooperating Societies and Hotel Headquarters

American Society for Metals—Benjamin Franklin . . . American Welding Society—Bellevue-Stratford . . . Institute of Metals Division, American Institute of Mining and Metallurgical Engineers—Adelphia . . . Society for Non-Destructive Testing—Benjamin Franklin.

HOTEL RATES IN PHILADELPHIA

Hotel	Single	Double	Twin-Bedded	Hotel	Single	Double	Twin-Bedded	Hotel	Single	Double	Twin-Bedded
ADELPHIA.....	\$5.00 up	\$7.00 up	\$8.00 up	ESSEX.....	3.50 up	5.50 up	7.00 up	SHERATON.....	5.00 up	6.00 up	7.50 up
BARCLAY.....	5.00 up	8.00 up	8.00 up	HAMILTON COURT.....	3.00 up	6.00 up	6.00 up	SYLVANIA.....	4.00 up	6.00 up	6.00 up
BELLEVUE-STRATFORD.....	4.00 up	7.00 up	8.00 up	LORRAINE.....	3.50 up	6.00 up	x8.00 up	TRACY.....	x3.50 up	4.50 up	4.50 up
BENJAMIN FRANKLIN.....	4.50 up	6.50 up	8.00 up	MAJESTIC.....	2.50 up	5.00 up	x6.00 up	WALNUT PARK PLAZA.....	4.00 up	6.50 up	7.50 up
BRIERHURST.....	2.50 up	3.50 up	5.00 up	NORMANDIE.....	3.50 up	4.50 up	5.00 up	WARBURTON.....	3.50 up	5.50 up	6.00 up
BROADWOOD.....	3.00 up	5.00 up	6.00 up	PARKER.....	3.50 up	4.50 up	5.50 up	WARWICK.....	.....	.....	8.00 up
CHANCELLOR HALL.....	4.00 up	6.00 up	6.00 up	PENIN-SHERATON.....	4.00 up	6.00 up	6.50 up	WHITTIER.....	3.00 up	5.00 up	6.00 up
CHATEAU CRILLON.....	.....	.....	7.00 up	RITZ-CARLTON.....	5.50 up	8.00 up	8.00 up	WALT WHITMAN.....	5.00 up	7.00 up	8.00 up
DRAKE.....	5.00 up	7.00 up	8.00 up	ROBERT MORRIS.....	3.00 up	5.00 up	6.00 up				
				ST. JAMES.....	3.50 up	5.50 up	7.50 up				

x—Without Bath.

FILL OUT AND MAIL THIS COUPON — NOW!

Charles L. Todd, Manager, Housing Bureau
Architects Bldg., 17th and Sansom Streets
Philadelphia 3, Pa.

Date.....

Please make hotel reservations as shown below:

Hotel..... 1st Choice

Hotel..... 2nd Choice

Hotel..... 3rd Choice

Number of Rooms with Bath..... Double Bed Room(s) —

Rate Preferred \$.....

..... Twin-Bedded Room(s) —

Rate Preferred \$.....

..... Single Room(s) —

Rate Preferred \$.....

Arrival Date October..... ☐ A.M. ☐ P.M.

Departure Date October.....

Note: If you find that you are to arrive after 6 P.M. or on a different day than reservations called for, be sure to wire hotel before the date of your reservation, informing them accordingly. Otherwise your reservations may be cancelled.

Room(s) Will Be Occupied by: (Be sure to designate those who are to occupy same room.)

NAME

STREET

CITY

STATE

Applicant..... Title.....

Company.....

Street Address.....

City..... Zone..... State.....

Member of A.S.M. ☐ A.W.S. ☐ A.I.M.E. ☐ S.N.D.T. ☐

IMPORTANT: Assignment of rooms will be made by the Housing Bureau beginning August 1st, 1948, BUT NOT EARLIER. As soon as possible thereafter you will receive confirmation direct from the Housing Bureau. Duplicate will go to the hotel accepting reservations.

(61) AUGUST, 1948

Prof. Demorest Resigns Chairmanship; Succeeded at Ohio State by Fontana

Prof. Dana J. Demorest will step aside as chairman of the department of metallurgy at Ohio State University on Sept. 1 after 33 years of service. He will, however, continue to teach for four more years before retiring. Professor Demorest will be succeeded as chairman of the department by Mars G. Fontana.

Graduating in 1907, Professor Demorest joined the staff in 1908. Except for a brief period when he served as a major in the chemical warfare service of the Army during World War I, he has been with the department of metallurgy, most of the time as chairman or acting chairman. Professor Demorest enjoys the unique distinction of having a life membership in the American Society for Metals, presented to him by the O.S.U. alumni group during the National Metal Congress in 1943.

Dr. Fontana joined the metallurgical staff at Ohio State in 1945 as professor of metallurgical engineering and also professor of metallurgical research in the engineering experiment station. He came there from the E. I. du Pont de Nemours & Co., where he had been a metallurgical engineer for 11 years.

He received a Bachelor's degree in Chemical Engineering and Master's and Doctor's degrees in Metallurgical Engineering from Univer-

sity of Michigan, where he was a research assistant from 1929 to 1934.

Dr. Fontana is chairman of the Columbus Chapter A.S.M. and is on the society's national Publications Committee. He is chairman of the corrosion division of the Electrochemical Society and a member of the board of directors of the National Association of Corrosion Engineers.



D. J. Demorest



M. Fontana

Purdue Univ. Schedules Metals Casting Conference

Purdue University has scheduled a Metals Casting Conference to be held Nov. 4 and 5 on the Purdue campus in Lafayette, Ind. Sponsored by the Purdue department of general engineering, school of chemical and metallurgical engineering, technical extension division, with the cooperation of the American Foundrymen's Association, the conference will cover subjects of interest to management, supervisory personnel and others interested in production and use of castings.

C. T. Marek, assistant professor in charge of casting processes, is chairman of the program committee, and R. W. Lindley, professor and chairman of engineering shops, is secretary. Others on the committee are Professors H. A. Bolz and G. M. Enos, P. H. Harlan, vice-president of Electric Steel Casting Co., Indianapolis, and F. T. McGuire of Sibley Machine and Foundry Corp., South Bend.

Electric Metal Makers Hold Annual Meeting

The 16th annual meeting of the Electric Metal Makers Guild was held in Bethlehem, Pa., June 16 through 18. On the opening day of the meeting, C. H. Herty, Jr., assistant to the vice-president, Bethlehem Steel Co., addressed the joint technical session on the fundamentals of steel melting.

The guest speaker on the following day was C. E. Sims, assistant director, Battelle Memorial Institute, whose subject was "Hydrogen and Nitrogen Contents of Steel". Another highlight of the session was an open forum on the use of oxygen in electric furnace steelmaking. The last day of the meeting was devoted to a visit to the Bethlehem Steel Co. plant.

The following officers were elected for the coming year: President—A. J. Scheid, Jr., Columbia Tool Steel Co., Chicago Heights, Ill.; vice-president—F. O. Lemmon, Ohio Steel Foundry Co., Springfield, Ohio; secretary-treasurer—D. L. Clark, Simonds Saw and Steel Co., Lockport, N. Y.

Atomic Energy Speaker at St. Louis Chapter

(Photo on Page 35)

Reported by Louis Malpocker
Lincoln Engineering Co.

"Production and Use of Atomic Energy" was the subject presented before the May meeting of the St. Louis Chapter A.S.M. by Wayne H. Keller of Mallinckrodt Chemical Works, where he assists in the direction of chemical, engineering and metallurgical research into processing and production methods for the atomic energy product.

Dr. Keller explained the mass-energy relationship involved in the release of nuclear energy, and contrasted the enormous quantities thus evolved with the quantities of energy released in ordinary chemical reactions such as combustion. America must retain her lead in this field by continued development and research, he emphasized.

Further experimentation and research are necessary before nuclear reactions can be used economically as a source of power, Dr. Keller stated. Many engineering difficulties are involved, such as the development of high-temperature and high-pressure alloys and refractories, the protection of personnel from radiation and the difficulties of construction, operation and maintenance imposed by radiation.

Translation Index Service For Technical Articles

Translating costs for many scientific and technical articles and reports in foreign journals can now be eliminated by the use of a new "Union Card Index of Technical Translations" compiled and serviced free of charge by the Science-Technology Group of the Special Libraries Association. A master card file records known translations into English from foreign language articles or reports in the fields of engineering, materials, aeronautics, chemistry, metallurgy, communications, petroleum, and technology.

Any organization or institution engaged in research in these fields is invited to cooperate by sending a record of its translations to the index. Anyone interested in learning the existence of a translation of a certain reference is invited to use this service. The index service does not supply the translations, but acts as a clearing house to furnish the name of the organization or agency which already has a translation. Arrangements can then be made for the loan or purchase of a copy.

Inquiries concerning the new service should be addressed to Mrs. Miriam Landuyt, research librarian, Caterpillar Tractor Co., Peoria, 8, Ill., chairman of the Translation Index Service.

Tin Smelting Plant Announced

The only privately owned tin smelting plant in the United States is to be erected by the Vulcan Detinning Co. at Sewaren, N. J., with the Wigton-Abbott Corp. of Plainfield, N. J., as engineer and contractor. The new smelter will cost approximately \$400,000, and will be constructed on the grounds of the present plant.

Technical Publicity Consultant

Clyde J. Hibler, formerly with Surface Combustion Corp., Toledo, Ohio, has moved to Chicago and established a consulting service for the preparation of technical catalogs, manuals and publicity.

Utility and Futility Of Common Tests for Drawability Pointed Out

Reported by R. F. Thomson
International Nickel Co.

The program for the June 4th meeting of the Affiliate Council of the Engineering Society of Detroit was sponsored by the Detroit Chapter of the American Society for Metals. C. L. Altenburger, research metallurgist of Great Lakes Steel Corp., presented the technical paper, speaking on "Plastic Deformation as Related to the Forming of Metals".

Mr. Altenburger pointed out the "utility and futility of the common tests used in estimating the drawability of metals". An extremely useful criterion, he said, is the determination of the maximum blank diameter which can be satisfactorily drawn over a punch of given diameter. Comparing soft steel, aluminum and low-alloy, high-tensile steel, Mr. Altenburger showed that a 6-fold increase in yield strength and a 12-fold increase in elongation do not sensibly change the ratio of maximum blank diameter to punch diameter when comparing the drawability of these different materials.

After a brief discussion of the possible state of stress in a sheet

being formed, the speaker told how flowability is related to the product of the ratio of imposed shear strength to imposed normal stress and the ratio of normal metal resistance to the shear flow resistance (normal metal resistance being resistance to parting when acted upon by normal forces). He then presented an equation for calculating critical blank diameter. Good agreement is found with experimentally determined values, although the correlation may be fortuitous.

Drawability of a given shape is not a function of longitudinal ductility as measured in the usual tensile test. In small stampings the elongation that takes place over the necked-down area may be important but it becomes insignificant in making long draws. For the latter, uniform tensile ductility is more important.

Flow can only occur if the resistance to flow in shear is exceeded before the normal stress exceeds the resistance of the metal to part under tensile stress, Mr. Altenburger concluded.

Promoted by Tinnerman

William M. Buttriss has been appointed director of advertising and sales promotion for Tinnerman Products, Inc., Cleveland. Mr. Buttriss has served Tinnerman since 1934.

ADVERTISERS INDEX

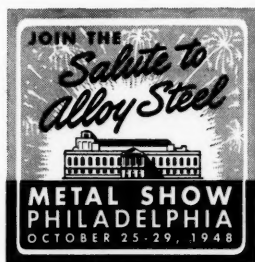
American Chemical Paint Co.	51
Arcos Corp.	Front Cover
Armour & Company	45
Electric Furnace Co.	43
Enthone, Inc.	47
Harshaw Chemical Co.	53
Holden Co., A. F.	Back Cover
Institute of Metals	55
Ryerson & Son, Inc., Joseph T.	39
Special Chemicals Corp.	51

~ ~ ~

A. P. Ford, Advertising Manager
7301 Euclid Ave., Cleveland 3, Ohio
UTah 1-0200

Robt. S. Muller, Eastern Manager
55 West 42nd St., New York 18
Chickering 4-2713

Don Harway, West Coast Rep.
1709 West 8th St., Los Angeles 14
FAirfax 8576
57 Post St., San Francisco 4
Yukon 6-1069



ADVANCE REGISTRATION FORM

30th NATIONAL METAL EXPOSITION

Just fill in the coupon below and mail prior to Oct. 15 and your badge will be made and mailed to you BEFORE THE SHOW. With this advance badge you may enter immediately and avoid delay at the Registration Desk.

MAIL TO: ADVANCE REGISTRATION
NATIONAL METAL EXPOSITION—CONVENTION HALLS
34TH STREET BELOW SPRUCE ST. PHILA. 4, PENNA.

SAVE TIME
AND WAITING

AT
REGISTRATION
DESK



FILL IN THIS
COUPON
AND MAIL
TODAY



YOUR NAME		TITLE OR POSITION	
PLEASE PRINT			
COMPANY NAME		NO. EMPLOYED AT YOUR PLANT	
ADDRESS		CITY	STATE
IS YOUR CO. A MFG'R?	YES NO	BUSINESS, IF NOT A MFG'R?	
MAJOR PRODUCTS OF YOUR COMPANY AT YOUR PLANT			
CHECK BELOW THE DEPARTMENT IN WHICH YOU ARE EMPLOYED:			
1) MANAGEMENT <input type="checkbox"/>	3) ENGINEERING <input type="checkbox"/>	5) PURCHASING <input type="checkbox"/>	7) EDUCATION <input type="checkbox"/>
2) PRODUCTION <input type="checkbox"/>	4) METALLURGY <input type="checkbox"/>	6) SALES AND ADVERTISING <input type="checkbox"/>	8) <input type="checkbox"/>
CHECK PREVIOUS NATIONAL METAL EXPOSITIONS, IF ANY, YOU HAVE ATTENDED:			
CHICAGO, 1947 <input type="checkbox"/>	ATLANTIC CITY, 1946 <input type="checkbox"/>	CLEVELAND, 1945 <input type="checkbox"/>	

MAIL THIS COUPON PRIOR TO OCT. 15

(63) AUGUST, 1948

**AT LONG
LAST!**

NOW READY



METALS HANDBOOK

**1948
EDITION**

TO A.S.M. MEMBERS: INSTRUCTIONS FOR EXCHANGE

CANADIAN AND FOREIGN MEMBERS: PLEASE SEE SPECIAL NOTICES BELOW

This is your official notice that the 1948 edition of the ASM METALS HANDBOOK is available and will be forwarded to all members in good standing upon receipt of the 1939 edition of the METALS HANDBOOK now in your possession.

The Board of Trustees requires that the old edition must be returned before the new one may be sent. The purpose of returning the old books is to take them out of circulation so that members will have only the very latest information.

Just wrap one layer of paper around the old book and tie it securely with a stout cord. The book weighs approximately five pounds, and the parcel post rate (depending on your distance from Cleveland) is as follows:

Established rates for mailing the old Handbook, 1939 edition, to Cleveland

Local	Zone 1-2 up to 150 Miles	Zone 3 150-300 Miles	Zone 4 300-600 Miles	Zone 5 600-1000 Miles	Zone 6 1000-1400 Miles	Zone 7 1400-1800 Miles	Zone 8 Over 1800 Miles
10c	14c	18c	25c	34c	41c	52c	61c

CANADIAN MEMBERS

Please do not mail your '39 Handbook to Cleveland, but mail or deliver it to your local chapter secretary. He will handle details of exchange.

**PLEASE DO NOT SHIP
TO CLEVELAND.**

FOREIGN MEMBERS

You will *not* be required to return your old edition. The '48 edition will be mailed to you automatically.

ALLOW AT LEAST THREE WEEKS FOR EXCHANGE

Please consider the time required for the book to travel to the Cleveland office, where the records will be processed, new labels made and forwarded to the printers, so they can ship the new book to you.

Every effort will be made to reduce the time interval to the minimum but three weeks may elapse from the time you mail your copy until your new edition is received.

The Society can accept for exchange only that old Handbook which has the member's name and number on the inside front cover which corresponds with the records in the national office; also the member's dues must be paid in full at the time the book is received in the national office. A new book cannot be sent to the member who has been billed for dues but whose dues have not yet been received at headquarters.

MAIL THE OLD HANDBOOK AT ONCE TO

AMERICAN SOCIETY FOR METALS
7301 EUCLID AVE. CLEVELAND 3, OHIO

A Salute to **ALLOY STEEL**

AS THE CENTRAL THEME
OF THE 30TH NATIONAL



METAL CONGRESS & EXPOSITION **PHILADELPHIA - OCTOBER 25 - 29, 1948**

Alloy Steel has assumed such a tremendous role of such primary importance in so many essential industries, that the American Society for Metals welcomes this opportunity to dedicate as the theme of the 30th National Metal Congress & Exposition — "A Salute to Alloy Steel".

Alloy Steel is a truly American achievement. Since the tremendous improvement in Alloy Steel during the past 30 years has paralleled the growth and importance of the American Society for Metals, it is fitting that the 20,000 members of this society, who represent the Alloy Steel producing and consuming industries, should sponsor this well-deserved tribute.

BRILLIANT TECHNICAL PROGRAM

A vast panorama of progress in Alloy Steel production and fabrication will be presented at the Philadelphia Metal Congress & Exposition. A brilliant program of over 100 stimulating and helpful technical papers on all aspects of Alloy Steel will be presented by recognized authorities at the Metal Congress.

DISTINGUISHED SERVICE AWARDS

An outstanding feature of this diamond jubilee of Alloy Steel will be the presentation of "Distinguished Service Awards" to individuals who, by research, improved manufacturing processes, experimentation,

new applications and various other means, have contributed to the improvement, development and acceptance of Alloy Steel. Nominations for these awards will come from the entire metal industry and will be judged by a special Awards Committee of top-ranking executives.

THE DRAMA OF ALLOY STEEL

Along with the distinguished displays of over 350 manufacturers and processors of metals and metal products will be a spectacular dramatization of the 75 years progress in Alloy Steel. Occupying the entire stage of Convention Hall, this exhibit will give visitors to the Exposition the complete story of Alloy Steel.

From all over the nation, metal men are making plans to come to Philadelphia for this great jubilee. Don't miss it—make your arrangements TODAY!

Sponsored by the American Society for Metals in co-operation with the American Welding Society, the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers, and the Society for Non-Destructive Testing.

**MAJOR MANUFACTURING FIRMS ARE EXHIBITING
THEIR LATEST ALLOY STEEL PRODUCTS**

WRITE OR WIRE COLLECT
W. H. Eisenman, Managing Director
National Metal Exposition
7301 Euclid Avenue—Cleveland 3, Ohio
UTah 1-0200

ELECTRODE FURNACES—Steel or Cermatic Pots, 300° F. to 2400° F. For Martempering, Austempering, Liquid Carburizing, Neutral Hardening, Isothermal Annealing, Descaling, Forging. Pot Life—6 months to 4 years, depending on temperature.

2



1

HOLDEN GASIFIER generates gas from oil or gasoline. Capacity 1,500,000 to 8,000,000 BTU per hour. Turn-down ratio 10 to 1. Price with all accessories for 1,500,000 BTU per hour \$650.00

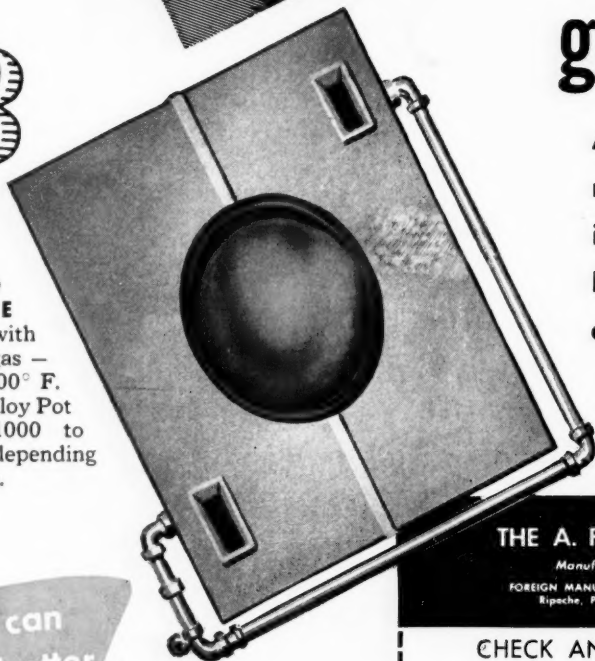


HOLDEN offers 3 ways to beat gas shortage

Avoid future production bottle-necks and costly downtime resulting from low gas supplies. These Holden units are available for converting existing facilities and adapting latest metallurgical developments to your process.

3

FUEL FIRED POT TYPE FURNACES with combination gas — oil burners. 300° F. to 1700° F. Alloy Pot Guarantee: 1000 to 1500 hours, depending on application.



THE A. F. HOLDEN COMPANY • *Metallurgical Engineers*

Manufacturers Heat Treating Baths and Furnaces • NEW HAVEN 8, CONN.

FOREIGN MANUFACTURERS • Canada: Peacock Brothers, Ltd., Montreal • France: Fours Electriques, Ripache, Paris • Belgium: Le Four Industriel Belge, Antwerp, and other principal countries

CHECK AND MAIL FOR PRODUCT INFORMATION

- ☐ 1 HOLDEN GASIFIER
- ☐ 2 ELECTRODE FURNACES
- ☐ 3 POT TYPE FURNACES

Firm Name

Your Name Title

Street

City State

You can
do it better

in HOLDEN
SALT BATHS and
FURNACES

ates
Ca-
000
wn
ac-
TU
.00

neers

iques